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AMERICAN PLANTS IN PHILIPPINE ETHNOBOTANY

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This study forms an element in the much larger and more complex problem of the ethnobotany of the Philippines, a large topic because of the rich tropical flora available to the inhabitants of the Philippines, and because of the clever uses to which they have put that flora.

A discussion of the American plants in the culture of the Philippines should have value, since it was by way of the Philippines that many American plants entered Asia; the subject thus ties up with the larger problem of American plant migration.

I must acknowledge special indebtedness to Dr. E. D. Merrill, of the New York Botanical Garden, whose work in the botany of the Philippines reduced chaos to order and furnishes the foundation for research in Philippine ethnobotany. I am further indebted to him for correspondence and suggestions in the preparation of this paper. I have also had the advantage of the interest of Dr. Paul C. Standley, of the Field Museum of Natural History, from whose encyclopædic work, The Trees and Shrubs of Mexico, I have often quoted. He was kind enough also to go over this paper and has made many valuable suggestions with reference to the botany involved. Prof. Robert Redfield, of the University of Chicago, has given me many suggestions regarding plants in Mexican culture.

THE AGRICULTURAL COMPLEX IN THE PHILIPPINES

Technic.—There is an almost world-wide, primitive, tropical, agricultural technic, consisting in simply cutting down the trees and clearing the land by burning the dried remains. This gives a temporary clearing sufficient to snatch a crop before the land is reclaimed by wild vegetation.

Cook,(28, p. 2) in an excellent discussion of this technic in tropical America, terms it the *milpa* system and shows how, with even the crudest stone implements and the use of fire, man is enabled to steal a march on Nature and secure a subsistence without the necessity of plowing, hoeing, and weeding. In parts of Central America planting is still done with only the use of a charred stick. This represents about the simplest possible agricultural technic.

The same author points out a great advance in American agriculture when specialized and permanent systems of terrace agriculture were developed for the cultivation of maize in Peru and Central America. Nor does he fail to note similar systems of terracing used for the cultivation of rice and other crops in eastern Asia. In both areas the advanced groups practicing this technic are surrounded by marginal neighbors who use the milpa system.

In the Philippines, the area under discussion in this paper, both systems are practiced. Here there can be no doubt that similar natural conditions of a tropical country and a people with a primitive culture have produced a counterpart of the milpa system, here called the *kaiñgin* system. This primitive system is typical among the Negritos everywhere; the Ilongots of the eastern Cordillera of northern Luzon; and throughout the mountains of Mindanao, as described among the Subanuns of Zamboanga Peninsula;(6, p. 46) and the Bagobos of Davao Gulf, (26, p. 132) who only use the digging stick.(1, p. 6) In general, the kaiñgin system is used to the exclusion of other technics by the peripheral groups in the Philippines.

Corresponding to the more-advanced terrace system of America, the tribes of the mountains of Luzon use a rice-paddy system which permits the cultivation of lowland rice. In these mountains this rice-paddy technic has developed into the most magnificent system of terraces in the world.(23, pl. 20, p. 160) Jenks, in discussing these terraces, flirts with the idea of a trait introduction from China, but decides that it is an early trait,

"which spread from the nest of the primitive Malayan culture." (12, p. 88)

To the writer, however, it seems simpler and more in keeping with the facts to recognize that these terraces are essentially rice paddies that have been constructed to fit the topography of the mountainous terraine. So as population outgrew the small areas available in the sloping valleys, the people were forced to hang their paddies on the mountain sides, by the "invention" of terraces, which we see after all invented themselves as an adaptation of the old trait (the rice paddy) to a new condition.

Content of the agricultural complex.—In the terrace only lowland rice is produced and the groups that use the terrace also make use of the kaiñgin system for producing more than half of their food supply.

Rice is the prized and esteemed food to which the ceremony and ritual and prestige attach.

From the kaiñgin, however, the agricultural complex is completed with gabi (*Colocasia antiquorum*), ubi (*Dioscorea* sp.), and the American plants camote and corn. The essential native fruits are bananas, mangoes, and coconuts. Bamboo is everywhere of great importance.

Important in the ethnobotanical configuration is the betel nut, or *buyo,* complex, which enters the agricultural complex as the vine *Piper betle,* which produces the leaf, and the palm *Areca catechu,* which furnishes the nut.

The betel-nut complex in Philippine culture.—An understanding of the buyo (or betel-nut) complex is pertinent in this paper because of the fact that the American plant tobacco attached itself integrally to it, modified it, and has tended to displace it.

The buyo complex is one very closely integrated into the culture of this part of the world. This striking habit was noted by Pigafetta upon the discovery of the Philippines, and is thus well described by de Morga, 1609: (2, 16: 97–99)

> The ordinary dainty throughout these Islands and in many kingdoms of the mainland is *buyo.* This is made from a climber [Piper betle] whose leaf is shaped like a mulberry; and from a palm [Areca catechu] is secured a fruit which resembles an oak acorn. This fruit, which is called *bonga,* is cut lengthwise into strips and each strip is wrapped in an envelope made from the leaf. With the *bonga* is thrown in a powder of lime. This compound is placed in the mouth and chewed. It is so strong a mixture, and burns so much that it induces sleep and intoxication. The saliva and all the mouth is made as red as blood. It does not taste bad.

They consider it very beneficial, whatever quantity goes into the stomach for strengthening it, and for various diseases. It strengthens and preserves the teeth and gums from all inflammations, decay and aches.

Even the Spaniards took it up, and served it on trays like chocolate in New Spain (Mexico).

The natives (especially the chiefs), whenever they leave their houses, take for show and entertainment their boxes of *buyos* which they call *buccetas*. These are often handsome, being made of metal and other materials. They also carry a scissors and other tools for making *buyo* with cleanliness and neatness. Wherever they may stop they make and use their *buyo*. (2, 16: 97–99)

The carrying of the elaborate buccetas is no longer seen in Luzon, but is still characteristic in Mindanao among the Moros where the buyo complex has been much less influenced by tobacco. Among them still, as throughout the Philippines in pre-Spanish days, the amenities of friendship and hospitality are expressed in a ceremonial chewing of the betel nut.

The betel nut entered in death ceremonies and burial preparation. Chirino in 1604 records: (2, 12: 302–303; 40: 80)

The dead body is anointed with aromatic balsams which prevent corruptions, especially *buyo*. For the living it is a notable stimulant and the Indians carry it in their mouths as they use the coca [Erythroxylon coca] in Piru. With the juice of this plant they anointed the body, and so injected it through the mouth that it penetrated the whole body.

This is also recorded by Colin in 1663. (9)

The ceremonial use of betel as an offering to the *anitos* (spirits) was everywhere a commonplace and is still characteristic of the mountain peoples, though more prominent in Mindanao. (1, p. 104)

TOBACCO IN THE ETHNOBOTANY OF THE PHILIPPINES

Into this elaborate betel-nut complex of use, ceremony, offering, and social custom the American plant, tobacco (*Nicotiana tabacum*), promptly became integrated.

Stafford in an excellent account of the place of tobacco in the ethnobotany of North America says: (38, p. 389)

Tobacco was regarded by the Mexicans as a sacred or magic herb. It was used in their ceremonies and religious rites in the form of incense. They also inhaled its smoke and chewed its leaves together with lime.

Its use for chewing with lime is a striking convergence with the betel complex with which it integrated in the Philippines.

So widely spread was tobacco at the time of the discovery of America that although a plant of sub-tropical origin it was found in cultivation as far north as the St. Lawrence River.

At meetings of ambassadors, councils of nations, treaties of peace, and the reception of visitors, the calumet, or pipe of peace was invariably circulated. (38, p. 391)

Upon its introduction into the Philippines it was bodily taken out of this context yet promptly joined itself closely into the ritualistic and social complex of buyo. It was first chewed but soon came to be smoked and has displaced buyo in most parts of the Philippines as the common token of hospitality and friendship, except in Mindanao.

Tobacco was introduced into the Philippines by the missionaries in the last quarter of the sixteenth century, (2, 38: 28) and met with remarkable popularity as elsewhere in the world. Many references to it show how quickly "it became the most acceptable gift and a thing the Filipinos esteem highly," to quote Navarette. (2, 38: 28)

In Mindanao the social implications of the betel-tobacco complex is thus interestingly described in the dashing account by the English buccaneer Dampier who spent the year 1686–87 in the Philippines, attracted thither by the annual treasure galleon. Under the heading, A Comical Custom at Mindanao, (2, 39: 25) he says:

There is one kind of begging custom at Mindanao that I have not met elsewhere in my Travels. When Strangers arrive there, the Mindanao Men will come aboard and invite them to their houses, and inquire who has a *Comrade* (which word, I believe, they have heard from the Spaniards) or a Pagally, and who has not. A *Comrade* is a familiar Male-friend; a Pagally [Dyke word for kinsmen, comrade or fellow, also *panggal*, pillow, and *panggan*, bedstead. The Moro word for sweetheart is babay a magan pangaluman. B. and R. note.] is an innocent Platonick Friend of the other Sex.

All strangers are in a manner obliged to accept this Acquaintance and F'amiliarity, which must first be purchased with a small Present, and afterwards confirmed with some gift or other to continue the Acquaintance. And as often as the Stranger goes ashore he is welcome at his *Comrade* or Pagally's house where he may be entertained for his Money to Eat, Drink or Sleep; and is complimented as often as he comes ashore with Tobacco and Betel-nut, which is all the Entertainment he must expect *Gratis*.

The richest Men's wives are allowed the freedom to converse with her Pagally in public or may receive Presents from him. Even Sultan's or Generals' Wives, who are always cooped up, will yet look out of their Cages, when a stranger passeth by; and demand of him if he wants a Pagally; and to invite him to their friendship, will send a Present of Tobacco and Betel-nut to him by their Servants.

Though the "Pagally" custom has disappeared, in Mindanao up to the present time this betel-tobacco complex has been but

little modified; and among the pagans of the interior Finley's description of the Subanuns of Zamboanga Peninsula is characteristic.

> The entire chewing quid is composed of a small leaf of tobacco, a section of betel-nut, one *buyo* leaf and a small quantity of paste made from shell lime; together with ginger a local variant of the complex sometimes mixed with cocoanut oil or water. Women generally omit the tobacco; but Moros and pagans use it in this combination.
>
> This remarkable combination for chewing is placed in a betel-nut box which may be suspended from the shoulder, carried in a bag at the side, or in a belt or sash at the waist. (8, p. 20)

The smoking of tobacco has made some headway among this group, for he continues:

> Subanu are very fond of smoking a sort of cigarette made of native leaf-tobacco, and the soft inner husk of the corn. The tobacco is wrapped within this husk, and the whole is so folded as to take the shape of a cornucopia. (8, p. 20)

Tobacco, having attached itself to the betel complex in chewing, ritual, social custom, etc., soon became used for smoking, and thus to a large degree displanted the chewing of betel.

In 1751, Padre Delgado writes of the Visayans:

> Everywhere it is prized by the natives, like their daily food, and just as they cannot live without bread, they cannot pass through life without tobacco. There is not a meal of rich or poor that is not finished with a cigar. (7, p. 578)

On Luzon the same thing is true to-day. The immense cigars, often 2 inches in diameter and 18 inches long, smoked all day by men, women, and even children in the Ilocano provinces, still attract attention. Among them tobacco is an important economic crop for local use and export.

The Tinguians, which are a marginal group between the Ilocanos and the more-primitive mountain people, show tobacco actually displanting betel. Cole thus describes the old importance of the buyo complex still preserved in conservative tradition:

> Today betel-nut is less common, but the leaf (Piper betle) and the areca palm still play an important part in all ceremonies. According to tradition, it was possible in the old times to tell the fate of an absent friend by noting the condition of the vine planted by him prior to his departure. (25, p. 406)

Beyond this peripheral Tinguian area, in the higher mountains, are the Ifugaos. More secure in isolation the buyo complex has not been so greatly affected by tobacco. Here, Barton says, "betle-nut chewing ranks second to drinking in religious impor-

tance, and first in social and economic importance as a luxury." (22, p. 407)

The Bontoc area, situated on the Rio Chico, a tributary of Cagayan River permitting communication with Cagayan Valley where tobacco is the principal crop, has been more affected by tobacco. Here it is a definite trait linked with a folk-manufacture of brass pipes for smoking. One seldom sees a Bontoc without a pipe in his mouth, or tucked in his peculiar little cap, hung on the back of his head.

Across the Cordillera in the valley of Cagayan River tobacco comes into its own. In the lower provinces it is the only economic crop, and from here comes the best and most of the Philippine tobacco. Here, since the Spaniards came, a civilization has been built on the basis of two American plants, corn and tobacco. The rough terraine swept by typhoons and plagued by locusts was not suitable for rice; and the missionaries introduced corn, which is the staple food, but tobacco is even more important.

The great Cagayan River, the longest river in the Philippines, overflows annually and deposits a rich alluvium. In the little pockets of land so affected is raised the tobacco par excellence of the Philippines.

Tobacco is much used by the people; and here, I am reliably informed, they hang a gigantic cigar by a string from the ceiling from which each member of the family smokes in turn.

By 1781, this plant had become so profitable that Governor Basco y Vargas established a government monopoly in order to support the colonial government, which up to that time had been largely supported by an annual subsidy from Mexico. The next year the income was established, and by 1808 the net profit was half a million dollars. (4, 1: 173, 438–9)

Of the American plants introduced into the Philippines, tobacco is the most important in export and world trade from which arose the largest business organization in the Islands, the Compañía General de Tabacos de Filipinas, founded in 1886; (9, p. 266) which is the locally well-known Tabacalera and employs more men than the Insular Government.

Tobacco is universally known in the Philippines by its Spanish name, *tabaco;* varying only in Sulu to *tábaku.* (15, 3: 431)

STAPLE FOOD PLANTS INTRODUCED FROM AMERICA

IPOMOEA BATATAS (Linnæus) Poiret. Sweet potato; batata; camote.

Arguments for both an Old and New World origin of this plant have been put forth, though an American origin is now

accepted. De Candolle reviews "powerful arguments in favor of an American origin of this plant under its early name, *batata*, which later refers by mistaken transfer to the potato (*Solanum tuberosum*); and later the now common term camote (Nahuatl, *camotl*)." He then summarizes the argument for an Asiatic origin.(5, p. 54)

Laufer(31, pp. 239–51) disposes of the early Chinese mention of Bretschneider.(5, p. 54) Rumphius says that this plant was introduced into the Malay Peninsula from Manila.(5, p. 54)

As is the case with many other New World plants, the Philippines was the center of dispersal into Asia and consequently forms an important link in the chain, meriting a close examination.

Strangely enough the first reference to batatas in the Philippines comes from the first writer to have seen it. Pigafetta in 1521 mentions batatas near Cagayan Sulu Island.(2, 33: 207) Laufer shows the real likelihood that Pigafetta mistook another species like *Ipomoea mammosa*, a convolvuluslike plant with an edible root but of distinct botanical character, or more likely a yam, *Dioscorea*.(31, pp. 239–51)

Camotes were likely introduced into the Philippines by the Villalobos expedition of exploration in 1541, that we know planted corn. The natives attached special importance to everything the Europeans gave them, as attested by Legaspi's finding the Santo Niño at Cebu, which had been left by Magellan upon the conquest in 1571. The camote would be more highly prized.

That later observers are more particular in observing plants in the Philippines is shown by a reference in 1573, the time of the conquest of the Philippines. Captain Arieta notes, "certain roots resembling sweet potatoes (Ipomoea mammosa?), called oropsia, as well as yams (yuñames) and camotes."(2, 3: 202)

By 1582 camotes were recognized in Cebu as an American plant by Loarca, who notes, "roots resembling the potatoes of Santo Domingo, and called by the natives camotes."(2, 5: 45) This reference clinches the matter, since the writer's knowledge of the plant in the New World removes the doubt of a mistake in the identification; and more important, that the natives of Cebu at that early date called the plant *camote*, which is a Nahuatl name. To-day, as well, no other name is commonly used in the Philippines, although *lapni* (If.); *panggi-bagun* (Sulu); *tigsi* (Bic.); *tugi* (Bon.) are names for it in isolated tribes where Spanish contact was slight.(15, 3: 364)

By 1599 camotes were of sufficient importance, as a product, to merit mention by the governor to the Spanish king: "The land abounds in rice, fish and camotes."(22, 10: 262) Thirty years after the conquest, the agricultural complex of the Philippines had assumed its characteristic form. So we see that the camote spread with the greatest rapidity. Indeed the camote reached the mountains before the Spanish were attracted by Igorote gold. In 1623 the characteristic cultivation of the camote under the kaingin system was seen by the first explorers among them. (2, 20: 80)

In 1609 de Morga mentions "camotes (which are sweet-potatoes)."(2, 16: 80) In 1640 Bobadilla mentions "camotes which are the potatoes of New Spain" (Mexico).(2, 29: 298) In 1649 a Relation of the early Franciscan Missions states, "The Spanish brought . . . camotes, or potatoes, which have resulted very well, and are a cause of great support to this kingdom."(2, 35:302) In 1763 Mozo says that the root and the name of camotes were brought from Mexico;(2, 48: 91) this statement is repeated by Blanco in 1837.(3, 1: 129)

This American plant soon came to be of paramount importance to the people of the Philippines. It figures only second to rice in the diet and livelihood of the people. It is not only of vital importance as a catch-crop when frequent typhoons lay waste the rice paddies, but has become a staple food among the Filipinos.

Writing in 1751 Delgado suggests this importance when he says:

> When in the Visayas they have their camotihan (camote-field) they are all year assured of their bread for themselves and their families. It is planted from shoots or buds which soon extend long branches and soon reproduce. Thus they plant long rows, and by this simple operation assure their future.
>
> Though in America and Europe they need granaries to store up their crop, these natives have it always in the ground at the doors of their houses. (7, p. 766)

Blanco in 1837 adds this to our knowledge of the use of the camote:

> Its preparation for the kitchen is variable. It serves the Filipinos from soup to chocolate (by cutting it in fine slices and toasting it). It is also boiled and roasted in the skin.(3, 1: 139)

This plant is known as camote all over the Philippines, though there is a variety called *tigsi*, of which Blanco says: "In Ca-

marines there is a species called Tigsi, which yields a camote of very large size."(3, 1: 139)

As a staple food this is the most valuable of the American plants; and it is so commonly grown and used in the Philippines both in the mountains and the lowlands that it is second only to rice, by reason of the simplicity of its cultivation, and the ease with which it can be used.

In the mountains it is especially valuable, as it is best adapted to the kaiñgin system in the steep mountain clearings, which are also easier to work as the worker does not have to stoop over so far. Barton says:

> The camote is the most important of all crops to the Ifugao. Nevertheless the Ifugao despises camotes. To say a man has only camotes to eat is to pronounce him poverty-stricken. Yet camotes are the chief food of more than half the people.(22, 399)

According to Jenks,(12, 213) however, their neighbors, the Bontocs, are more appreciative of the camote and honor its planting with the Loskod ceremony. The pueblo "priest" performs this ceremony by killing a chicken or pig and petitions Lumawig (the chief deity) as follows: "May there be so many camotes that the ground will crack and burst open."

ZEA MAYS Linnæus. Indian corn; maize.

In the Philippines maize is called *maiz* (Sp.-Fil.) and *borona*, (33, 193) presumably by transfer from an earlier foreign plant—millet. Among isolated people to whom the Spanish name did not carry, the names are: *gahilang* (If.); *lgi* (Bon.); *maït* (Iv.), *mangi* (Ibn.); *tigi* (Bon.).(15, 1: 29) It was first planted in the Islands in 1541 by members of the Villalobos expedition, which explored the Archipelago before its conquest under Legaspi thirty years later.(2, 3: 69) They had brought it from Mexico as food.

In 1751, Delgado says that the Filipinos do not make tortillas, but make gruel, or when it is not yet ripe the *elote* (Mex. a tender ear of corn) is roasted.(7, p. 707)

A century later Blanco says:

> It first became popular as a catch-crop since it matures in seven weeks whenever the rice is destroyed. This opened their eyes to its value as a staple. It is generally eaten boiled or roasted in the fire.
>
> Some parts of Cebu produce the largest ears, but on Luzon it does well enough. Animals eat the stalks when they are dry, though some clever Filipinos wet it for forage when there is no grass.(3, 3: 90)

To-day, as when Blanco wrote, besides being eaten as roasting ears, the kernels are cracked into "grits" and then cooked in the same manner as rice.

Corn enters folk medicine in the Philippines. De Tavera says:

> The tassels have been used from time immemorial in decoction as a diuretic. The native medicine-man also gives a decoction from the stalk for various diseases of the bladder and kidneys. (19, p. 240)

The American plant maize (*Zea mays*) in aboriginal North America, much as rice in southwestern Asia, is the prized food—the staff of life, about which so much of the ceremony and ritual centered. The cultivation of maize extended from the Plata Valley in South America through northern United States, being the staple cereal food in all these areas. The technic for its production and use varied; and so much more complex and diversified were the rites and ceremonies that centered about it that the discussion of these aspects of the ethnobotany of maize in the New World cannot be attempted within the limits of this paper. Sturtevant's monumental work, Notes on Edible Plants, gives an excellent review. (10, 608)

Among the primitive peoples of Mexico to-day it is still produced under the primitive milpa system. The technics adhering to the maize complex in Mexico to-day are described by Starr: (39, p. 3)

> The use of the *metate* for grinding maize is universal. This instrument is a flat slab of stone with three supporting legs cut from a single block; one support being shorter than the others, so that the flat upper surface slopes somewhat. A second, long and cylindrical, but somewhat tapering toward the ends, is used as a grinder. This is called the *metlapilli* (child of the *metate*).
>
> The grains of maize are soaked in lye water and then rubbed to a dough with the metlapilli. This dough is slapped from hand to hand, being turned around and around until it is shaped into a thin, flat round cake, which is baked on an earthen griddle, the *comalli*, into the national *tortilla* (Sp. omelet for Nahuatl *tlazcal*, bread). There are several kinds of tortillas, thin or flat. Some have a dark green or bluish color and contain an admixture of *frijoles* (beans).
>
> *Tamales* are a sort of dumpling made of corn meal wrapped in corn husks and boiled. They may be sweetened, or hot with chili, or lined with meat or the flesh of fowls.
>
> *Atole* is a thickish sweet gruel of corn which is drunk from jicaras (cups). *Champurado* is a mixture of *atole* with chocolate.
>
> *Mole* is a stew of meat with nuts, raisins, vegetables, etc. in a chili sauce. Two of these are favorities, *totomol*, (Sp. mole de guahalote—turkey mole) and *tlilmol* (Sp. mole prieto—black mole).

Indian corn was planted in the Philippines in 1541, thirty years before the conquest. It did not meet the instant approval of the natives as did tobacco and the camote, and was slow to

take its present important place in the ethnobotany of the Philippines. As indicated by Blanco its utilitarian value as a catch-crop in case of need was recognized and used.

The Spanish missionaries were able to show its value, especially in regions where but little rice could be produced. To-day the people of Cebu (the most populous island) live largely on corn; and it has become the staple food of the lower Cagayan Valley in Luzon.

Upon its introduction into the Islands, it was completely taken out of its Mexican patterns, but unlike tobacco did not attach itself to local patterns to mold them. Corn left behind its complex of metate, metlapilli, and its products *tortillas* and *tamales*, though Delgado records its use in the Philippines as atole (gruel), though the word is not now in common use.

Instead of using the Mexican metate, the Filipino prepares corn by pounding the hard flinty kernels (these are the varieties prized) in a mortar with a pestle, the technic for husking rice, after which it is boiled and eaten like rice. Thus we see corn taken out of its Mexican context, and molded into the prevailing rice patterns.

A small mill of stone grinders, the upper of which revolves within the grooves of the lower is an improvement in technic that is sometimes seen. Elsewhere the corn is simply parched before being eaten, and commonly it is eaten green as "roasting ears."

Among the mountain people of Luzon, Cole reports that the common method of preparation of corn among the Tinguians is to place the grain on the large stone over which a smaller stone is rocked until a fine powder is produced. The stone disc mills before described have been introduced from the lowlands as well. (25, p. 405) Corn is raised in kaiñgins, and the terraces serve only for rice.

Farther into the mountains Jenks (12, p. 140) reports that in Bontoc the ears are husked, the silk is removed, and the corn is eaten from the cob without salt. Among the Ifugaos Barton (22, p. 405) reports that among the recent Silipan immigrants corn is the chief food supplementary to rice. This is explicable as an introduction from the adjacent Cagayan Valley, where corn is a staple food. Among the Ifugaos it is prepared for food by being parched or by being pounded into a meal in a rice mortar and made into corn pone.

In the mountains of Mindanao corn is raised in the kaiñgin with upland rice and the camote as staple foods among the Ba-

gobos(1, p. 6) and the Subanuns(8, p. 18) yet the ceremonies are given only in rice culture.(6, p. 86)

Contrasting with the elaborate ritual and ceremony connected with corn in the New World, in the Philippines such ritual is conspicuous by its absence. This did not escape so keen an observer as Cole, who says,

> Despite the fact that it is one of the most important crops, it has never gathered to itself ceremonial procedure, nor has it acquired a place in the folklore.(25, p. 405)

The explanation of this is not far to seek. In southeastern Asia, throughout an area as large as the indigenous corn culture area in America, rice occupies the key position, and about it attaches all the ceremony and ritual. It is the esteemed food and has an enormous importance in the lives and thoughts of the people. They not only prefer its taste to all other foods but among the primitive groups, in deference to rice, teeth are filed; and a multitude of ceremonies are carried out in connection with the planting, harvesting, and storing of rice.

Other foods are not so prized. Among the mountaineers a man maintains a status of wealth and greatness by eating rice three times a day. Other foods are for the poor and despised.

Among the more-advanced peoples of the lowlands, even on two of the most densely populated islands, the people have become corn eaters, since the natural conditions have forced this situation upon them. Yet corn is much less prized than rice, and the native attitude finds expression in apologies offered when corn in some form is set before a guest, the inference being that the host is tacitly admitting poverty in not offering rice.(30, p. 217)

Notwithstanding this prejudice, next to rice, corn has become the only important cereal in the Philippines. During 1915, 443,058 hectares were planted to corn with a yield worth over 8,000,000 dollars. The provinces that lead in the production are Cebu, Oriental Negros, Isabela, Leyte, Cagayan, and Bohol.(40, p. 167) In Cebu, the most populous province, with a million inhabitants, corn is the staple food.

LESS IMPORTANT NORTH AMERICAN FOOD PLANTS

The American plants, pumpkin and squash, we think of as associated with corn, but in the Philippines there is no such association. They are, however, important garden vegetables.

CUCURBITA MAXIMA Duch. Squash.

Despite de Candolle's doubts, this plant is now known definitely to be of American origin, and was generally cultivated by the Indians in their corn fields.

In the Philippines it is known to the Tagalogs as *kalabazang-bilog* (T.) and *calabazang-pula* (T.), which slight variation extended from north to south of the Archipelago, as well as: *kalabasi* (Su.), *karabasa* (Iko.), *kumbasa* (Bon.), obvious variations from calabaza (Sp.).(15, 3: 586)

It is now grown in all gardens throughout the Archipelago. It is one of the most important vegetables in the Islands and is eaten as a vegetable with meats.(40, p. 192) But squash escaped the American maize-squash complex, and in the Islands is cultivated alone.

LYCOPERSICUM ESCULENTUM Mill. Tomate (Sp.); tomato.

This common and important plant, probably native of Peru, was eaten by the aborigines of Mexico, and called *tomatl* among the Nahuatl nations,(10, p. 343) from which our name and the Spanish one derive. Mixed with chili it is commonly eaten as a sauce in Mexico.

It was introduced into the Philippines from Mexico at an early date and is there universally known by the Spanish name *tomates* or corruptions as: *kamatis* (B. M. T. S.), *kamates-bundok* (T.), and *kamates* (C.),(40, p. 369) while the isolated Ifugaos say *umli.*(15, 3: 586) It is now extensively cultivated and is also thoroughly naturalized throughout the Archipelago. The spontaneous form has evidently reverted, as the fruits are small and inferior.(32, p. 34) From fresh American seed, however, the fruit is large and excellent, but it rapidly deteriorates in succeeding crops in the Tropics.(15, 3: 586) Tarlac Province is now famous for its excellent tomatoes for the Manila market.

In 1751, Delgado says that they were little cultivated and were not used in cooking.(7, p. 773) To-day, however, they are one of the most important vegetables in the Philippines and are cultivated wherever there are people. The fruit forms part of almost all their meals as it supplies an important deficiency in their diet.

PHASEOLUS VULGARIS Linnæus. Kidney bean; haricot.

This is an American plant, though its cultivation has extended over the whole world. The mention of beans in Mexico is frequent. Sturtevant says of beans,

> The Olmecs had them before the times of the Toltecs and they were produced by the later Aztecs. The native Mexican word was *ayacolt*, though

they were the *etl* of the Aztecs, and when boiled in the pod were called *extol.*(10, p. 424) [Hispanicized as *ejotes*, string bean.]

To-day the bean, next to corn, is the most important food plant in Mexico; it is raised all over the country. No meal in Mexico is complete without beans, and many a meal consists of nothing else except corn(35, p. 212) but in the Philippines beans are not so prominent, being used mainly as string beans.

In the Philippines this species is known by the same names as *P. lunatus, habas* and *habichuelas* (Sp.-Fil.), *beríngi* (T.), and *butingi* (T. PV.). In isolated Bontoc the term *mula* appears.(15, 2: 319)

At the present time this annual herb is commonly grown for its tender pods, which are picked and eaten immature as "string beans," although it has been shown that they can be successfully grown and dried in the dry season,(40, p. 161) as they are in Mexico.

PHASEOLUS LUNATUS Linnæus. Lima bean.

The lima bean is unquestionably of American origin and de Candolle assigns its origin to Brazil,(10, p. 418) from where it was disseminated in earliest times by cultivation and has become naturalized in Peru and tropical America. It was probably introduced into Africa through the slave trade.(5, p. 345)

In the Philippines it has a variety of names which are freely applied also to the kidney bean (*P. vulgaris*) : *haba, zabache,* and *habichuela*(15, 2: 319) are Spanish terms often used. The most prominent name is *patani*(15, 2:319) used by the Tagalogs, Bicols, Visayans, and Ilocanos. The Tagalogs sometimes say *bulai-patani, buringi,* or *butingi.*(15, 2: 319) The Ilocanos of northern Luzon say *palpalai, parda,* or *percoles.*(15, 2: 319) The Ibanags of Cagayan Valley use the term *gulipatán.*(15, 2: 319)

The non-Christians of northern Luzon use these terms: *kilkilang, kutakut,* and *kopani,*(15, 2: 319) the last is a possible derivative from the common term patani; all are reported for the Bontocs. The Igorots of Benguet say *puida.* The non-Christian Bagobos of Mindanao call this plant *buni.*(15, 2: 319)

The nomenclature of this American plant shows a strong tendency to use the Spanish terms or patani among all the Christian people in close cultural contact, but varies widely among the marginal groups, where contacts were much less frequent.

Here it is of wide distribution and common cultivation and at the present time it is thoroughly naturalized in many parts of the Philippines. There are at least seven distinct forms, of

which the white-seeded varieties are best for culinary purposes. The colored or variegated beans should be boiled and the water changed two or three times to make them wholesome.(40, p. 176)

In 1751 Delgado writes:

> In Visayas the red beans are more abundant, while in Luzon the grey beans produce more. The *habas* are not native to the Philippines or of China. The annual galleon from Mexico brings habas and frijoles and from these the plants do not die unless destroyed by typhoons.(7, p. 730)

There is a similarly ambiguous reference to this species in Blanco, who says:

> The seeds are eaten, also the pod is little longer than two inches. It is not as much appreciated as *patani* (P. vulgaris?). The seeds are white with red and yellow spots.(3, 2: 270)

CAPSICUM FRUTESCENS Linnæus. Chile picante (Sp.); chili pepper.

An herbaceous plant, with small red fruits which have a very pungent taste, universally cultivated and used as a condiment. (33, p. 133)

De Candolle says that no *Capsicum* appears to be indigenous in the Old World, while its ancient and extensive distribution in South America indicates that it is indigenous there.(5, p. 345) Irish, who has carefully worked over the whole problem of *Capsicum*, says:

> Its use as a condiment is universal throughout the Tropics. When mixed with turmeric and spice it forms Curry powder. Cayenne pepper is the fruit of these small pungent varieties ground to a powder. Paprika is made from the fruit by grinding after removing the seeds, so is much less pungent. Soaked in strong brine or vinegar it makes Tobasco sauce. In Mexico Chili-con-carne makes use of these small peppers finely ground, and they also form an important ingredient in tamales.
>
> The rapidity with which the plants spread in tropical countries together with the increased commercial trade following the discovery of America caused a wide dissemination into the Old World tropics.
>
> The first explorers to the New World found it commonly used as a condiment and in Spain and India as early as the 16th century it was used in dressing meats; and supposed to be valuable in dyeing.(29, pp. 54ff)

This plant is the *ajo* or *uchu* seen by Creza de Leon in 1532–50 in Peru;(10, p. 136) and it is called *aji* in Cuba and Porto Rico. (19, p. 178) In 1570 it was found by Legaspi upon the conquest of the Philippines; he recorded that in the river of Bato (Cotabato) were found green peppers growing on trees as small as shrubs with their clusters like *agias*.(2, 3: 77) This indicates with what great rapidity this plant was disseminated, since only Magellan and Villalobos had visited the Islands prior to this time.

At the present time Merrill says of the distribution of this plant that it is "throughout the Philippines planted here and there about dwellings but also thoroughly naturalized in open waste-places in the settled areas." (15, 3: 424) Since its early introduction, this plant has assumed some little importance in Philippine culture as evidenced by the fact that it has carried modifications of its Spanish name into the languages of the regions where Spanish influence was strong.

The Spanish term *chile* is not uncommon, but is more often varied to *sili* in most dialects. The Tagalogs vary it to *chilengbúndok, siling labúyo,* or *siling pálai.* One Tagalog term, *pasitas,* escapes the Spanish pattern.

The Ilocano term *silit-diablo,* "chile of the devil," expresses an interesting folk reaction to its pungent taste.

The Bicols, of southern Luzon, in addition to *sili* have *rimorímo* and *lada.* The latter appears to have carried to Sulu, where it is used or varied to *lara.*

Among the Visayans local terms are *kilikot* and *katumbal,* although the hispanic form *sili* is common.

This latter term does not appear to have reached more-marginal peoples. The Ifugaos of northern Luzon use *paktiu;* while among the isolated Magindanaos of Cotabato on Mindanao the term is *kasira.* (15, 3: 424)

Thus we see an American plant of general distribution, but of only minor importance, able to carry its Spanish name only within considerable variations to the regions of strongest Spanish contact. Even here local names have arisen, while among the peoples outside the area of Spanish influence, the plant left its name behind.

In the Philippines it is commonly used as a condiment and as a native herb medicine. Pardo de Tavera says of it:

> As a tonic and a stimulant it is a useful article of food in hot countries where the digestive functions become sluggish. When used in moderation it is thought to prevent dyspepsia and consequent diarrhea and as a gargle for hoarseness. (19, p. 178)

Blanco records that the Filipinos cook the leaves with alum to get a good fast yellow dye. Also he has seen them apply the crushed leaves to the wounds made by mad dogs. (3, 1: 174)

CAPSICUM ANNUM Linnæus. Pimiento (Sp.); bell pepper.

This plant is definitely of American origin, probably from Brazil, though common in Mexico and the West Indies before the conquest. (5, p. 289)

This chile pepper, common and characteristic in the Mexican food as a condiment, is an herb or shrub of which many varieties have had a wide distribution.

In Mexico many kinds are used both in the seasoning of food and in making chile sauce. The sauce is made by crushing the red peppers (usually the long red one) with ripe tomatoes on a metate or sometimes the crushing is done in a clay dish with a pestle, or more often in the stone mortar *molcajete*. It is used with almost all kinds of food, especially with beans and meats. (35, p. 21)

This plant is of sufficient importance in Philippine culture to have been able to carry a slight variation of its Spanish name throughout the regions where Spanish contacts were strong. Among the Tagalogs, Ilocanos, and Bicols, the plant is known as *sili*,(15, 3: 424) a term also applied to *C. frutescens*. However, beyond the contact of the missionaries, the non-Christians have local terms exemplified by Bontoc where it is known as *kalubengan* or *kalubsengan*.(15, 3: 424)

UNIMPORTANT SOUTH AMERICAN FOOD PLANTS

It is worthy of note that the American plants of greatest utility in the Philippines are those from Mexico. This would show, were other evidence of a historical nature not available, that the plants, together with some lore of their possibilities, uses, values, and technics were brought over by the Spaniards. The Spanish friars not only brought the Filipinos "under the bells," but also through their organization, the Mission, taught them either new or improved ways of meeting their every-day problems. Until 1828, when the Acapulco galleon trade was stopped by the independence of Mexico, the Philippines were administered as a subcolony of New Spain. The friars all came through Mexico and were familiar to some extent with Mexican plants. This continuous contact and communication with Mexico is shown in the uses of American plants in the Philippines.

Of the South American plants only the pineapple (which was introduced from China) found an important place in Philippine culture. The peanut and the potato were in use in aboriginal Mexico, and consequently assume a more important place in the Philippines than arrowroot and cassava.

These are potentially very valuable plants, the latter being especially valuable to the natives of Central and South America; but in the Philippines they made very little impression, although the North American camote almost immediately superseded

gabe and *ubi,* native root crops, still common but everywhere yielding first place to the camote.

SOLANUM TUBEROSUM Linnæus. Potato.

The potato is a South American plant from the highlands of Peru and Chile where it is known as *papas.*(10, p. 545)

In Mexico the potato has degenerated to the size of a cherry or somewhat larger and is added to soups and stews along with raisins, olives, *pancas,* etc. There is a wild potato common in the mountains.(35, p. 227)

In the Philippines it is known as *papas* and *patatas,* which are the common Spanish names.(33, p. 185) As early as 1650 Navarrete found potatoes, sweet potatoes, and yams in the mountains of Mindoro.(2, 38: 28) Blanco records that the potato does not do well in the lowlands, though in parts of Pangasinan and the mountains of Benguet the inhabitants succeed in getting a good crop. From Chinese seed the roots are half as big as the fist.(3, 1: 179)

To-day, as a hundred years ago, the tubers are small and of inferior quality. They must be planted within the elevation limits of 600 to 1,200 meters.(40, p. 177)

They are still commonly planted among the Igorots of Benguet, but even at that altitude, my observation was that they degenerated to little larger than marbles. Nowhere do they form an important source of food, and are used much as in Mexico.

MARANTA ARUNDINACEA Linnæus. Arrowroot.

The arrowroot is a plant native to South and Central America. (10, p. 354) It is an herbaceous plant introduced into the Philippines from Singapore, probably in the last quarter of the nineteenth century, of fairly general distribution, but rarely cultivated and of little commercial importance,(40, p. 160) although it is grown as a source of starch in Camarines Sur, but in general rice starch is used.

Its Philippine names, *ararao* (T.) and *araro* (V. and P.) would appear to be corruptions of the English;(32, p. 29) but in 1887 *aroru* is mentioned as cultivated in Mindanao (probably in Surigao).(2, 43: 269) The Ilocanos and Bicols say *sagu* and in Batanes the name is *bai* (Iv.), while the non-Christian Bontoc term is *galamáka.*(15, 1: 250)

MANIHOT UTILISSIMA Pohl. Cassava; tapioca.

Cassava is an erect, frutescent plant from large tuberous roots. (33, p. 165) In the Amazon jungle region of South America,

this plant is the staff of life to the numerous tribes of Indians. It has been well named *utilissima.* About it Standley says:

> Cassava (Haitian *Cacabi,* bread, from the root *yuca*), is one of the valuable food plants of the world. Two well marked varieties occur, one that may be used without special treatment (yuca dulce), while the other has a very poisonous juice made harmless by heat. Meal, starch, and cassava or tapioca are prepared from the roots. Meal is prepared by peeling the root, which must also be heated in case of the poisonous variety. Starch is obtained by a precipitation from an infusion of the grated roots. Tapioca is prepared by roasting the starch grains.
>
> It is a native of Brazil but is cultivated in most tropical regions. It was cultivated in southern Mexico in pre-Columbian times, and in some places has escaped from cultivation. It was called by the Aztecs *quauhcamotl* (tree-potato).(21, p. 644)

Strangely enough it is most commonly known in the Philippines by the local equivalent of the same name: *camoting-cahoy* (tree-potato), other names being: *balangay* (V.), *kamote de Moro* (potato of the Moros) (Il.).(40, p. 253) The last name has basis in fact. The plants are cultivated and used as a common article of food only among the Yakan, the natives in the interior of Basilan Island, which is the largest of the Sulu Archipelago. Here it enters with rice and corn, ubi and camotes in the fundamental food complex.(20, pp. 14, 15) It is extensively used in Jolo. More isolated tribes call it: *malambóñga* (Tagb.), *padpádi* (Bon.), *panggi-kahui* (Su.).(15, 2: 450)

Though it is of universal distribution, it is otherwise very little used and of comparatively slight importance.(40, p. 253) A few foreigners' plantations in Mindanao produce it as a profitable commercial crop for its high content of starch (25 per cent), but it is still unimportant.

ARACHIS HYPOGAEA Linnæus. Peanut; mani (Sp.-Amer.); cacahuate (Mex.).

De Candolle, in a classic analysis of authority, decides that this plant is of Brazilian origin, where it is known as *mandubi;* from there it was introduced into Africa by the slave trade, and into southern Asia by the Portuguese at the end of the fifteenth century.(5, pp. 411–13)

This useful plant had a wide dispersal in America before the arrival of the Spaniards. In Peru it was known as *anchic.* Acosta in 1598 mentions the American name *maní,* which was adopted by the Spaniards. In Mexico after its introduction it was called *tlalcacahuate* because of its resemblance to the chocolate bean.

In the Philippines it is known by the Spanish name *mani,* and *cacahuate,* which is the best evidence that it was introduced

by the Spaniards from Mexico. The plant left behind its Spanish name before getting to Sulu, where Spanish influence was very slight. Here it is called *batung-china,* which shows a folk recognition of its exotic introduction.(15, 2: 283)

It is extensively grown but is chiefly utilized for forage at the present time, although the nuts are commonly eaten by the people and are often seen for sale in the markets. Blanco, writing in 1837, says,(3, 2: 303)

> They give it to their horses after it has dried some time, although the nuts are eaten. It is well known that the natives do not use all of its (utilidades) values.

AMERICAN FIBER PLANTS

The flora of the Philippines is astonishingly rich in fiber plants, and rattan, bamboo, abacá, cotton, etc., are cleverly utilized in many ways by the Filipinos.

America had little to offer the Philippines in fibers. Abacá (*Musa textilis*) is a fiber plant par excellence, which yields only in the Islands though it also grows in Sumatra. It furnishes a fiber 4 feet long, and, I am told, stronger by weight than steel. This fiber furnished the fabric for the native costume in pre-Spanish Philippines. These fabrics were woven on the back-strap or semigirdle loom, which is distributed among all the primitive peoples of the Philippines to-day. Roth's study in primitive looms shows their general distribution in northwestern India, among the Tibetans, Chinese, Burmese, Assamese, Sea Dykes, Japanese and Ainu, Koreans (in Asia), among the Santa Cruz Islanders and Caroline Islanders (in Oceania), and among the ancient Aztecs and modern Mexican tribes.(36, p. 294)

I suppose this extraordinary distribution has not been overlooked by the extreme "diffusionists," and it certainly offers a fascinating problem for the study of prehistoric contacts between the New and the Old World.

The Spaniards found the Ilocanos spinning cotton and with a considerable cotton industry for trade with the Chinese. The industry persists to-day among the Tinguians, that fascinating marginal people, much as it was described by the early Spanish writers to have been practiced by the more-advanced Ilocanos.

It was among the Ilocanos particularly that the fiber of the *agave* met with favor and still persists as an important money crop. In the Visayan Islands, especially in Panay, which since prehistoric times has been a commercial and export center for fabrics, the agave was substituted for abacá in making the gauzy

fabrics called *nipis*, now unknown. Later they found that the pineapple gave a more silky fiber; and now agave is no longer used, a complete substitution of the pineapple fiber having been made. So far as I can find out, it is only in the Philippines that the pineapple plant is of greater value for its fiber than for its fruit.

Though costume in the Philippines would be a study beyond this paper, it may be pertinent to say that the first Spanish accounts show that most of the Filipinos wore a costume of abacá similar to that still worn by the Bagobos of Mindanao, which is thick and heavily woven.

A thin and loosely woven fabric of abacá is still made. It is known as "sinamay," but is less prized than "piña." The characteristic Philippine costume to-day is an interesting adaptation of a forgotten Spanish influence. In contrast to the other Malays, who commonly wear the sarong, the Filipino men when they dress in native style wear "calzones," or trousers, with a "camisa," or shirt, hanging over them, as do the Mexicans; either is the adaptation of the Spanish costume to a hot climate. The camisa is often made from piña fiber, and is thin, airy, and gauzy.

The women of the Philippines wear a peculiar costume, the charm of which is attested by every writer on the Philippines. The long skirt with its stately train is a heritage of a forgotten Spanish style. The train is sometimes tucked in at the waist or pinned up revealing a considerable portion of beautifully embroidered or lacy petticoat, often of silk. Over the skirt is worn a "tapis," a sort of apron, often very fancy. The woman's "camisa" is of this gauzy piña, or other sheer material, under which is worn a chemise. Its most noteworthy characteristic is the balloon-sleeve effect, the sleeve being carefully pressed upward. About the neck is a curiously folded neckerchief, of the same stuff. This characteristic and charming costume is becoming more a dress and ceremonial costume, as the camisa must be taken to pieces when it is washed and its use entails a great deal of care and trouble. However, the older women even among the poor, still wear it considerably. Among the Ilocanos there is a common variation in the use of the voluminous plain skirt. The slack is often drawn between the legs and tucked into the waist behind, giving a short-trouser effect, very practical for crossing streams and for the rough work that the poor women are constantly about.

AGAVE CANTALA Roxb. Maguey; century plant.

This American plant (5, p. 153) was first seen by white men in Yucatan. (10, p. 27) This peculiar and extraordinary plant, which is so important in its many variations in the life of Mexico, is known in the United States as the "century plant."

In Mexico the national drink *pulque* is fermented from the exuded sap of the large leaf maguey. (21, p. 107) A large cavity or bowl is hollowed out of the center of the pulque maguey, by taking out the core or bud; and into this cavity the sap oozes and is gathered twice a day. When fermented it furnishes the Mexican beer, *pulque*. The distilled drink *mescal*, or now more commonly *tequila*, is made from the small thin-leaf species. The Indians and Mexicans of the mountains use wild species, whereas on the mesa, these magueys are cultivated in large plantations. (35, p. 224)

An excellent and useful fiber, called *ixtle*, is made from the leaves. (21, p. 107) This fiber is spun into thread and rope by the Mexicans. The fiber not spun is used in washing. In pre-Spanish Mexico this fiber furnished the material for Indian garb.

This hardy xerophytic plant was early introduced into the Philippines, and it is mentioned in 1609. (2, 16: 184) This species does best in a tropical climate only in certain drier regions, especially in the Ilocano Provinces, Iloilo, and Negros. In the dry and sandy soil of the Ilocano Provinces it furnishes one of the most important economic crops and is extensively cultivated. The fiber is stripped only after the leaves have decomposed in the sea. The fiber is similar to sisal or henequen of Central America.

In the Philippines it is known as: *maguey* (Sp.-Fil.); *magai* (V.), an obvious corruption; and *nipis* and *pita* (Cebu), a name often used in Central America for the plants and their fiber, (33, p. 121) words of Spanish introduction descriptive of the cloth made from it. Padre Navarrete in 1650 mentioned its use as a hedge. It is never used to furnish alcoholic drink in the Philippines.

This plant was used to furnish a fabric for clothing until pineapple cloth took its place in general esteem. Padre Delgado in 1751 described *nipis*, woven of *maguey*, and made into light waists, airy and suitable for the Tropics. (7, p. 741)

The characteristic part of the dress of the Filipinos, both men and women, was then made of agave fiber but has since been woven of the fiber of another American plant, the pineapple (*Ananas comosus*), which is more highly prized for its fineness and glossy texture. This art, as the preceding, still centers in the Visayas, especially in Iloilo and Jaro.

The maguey fiber is still commonly used for rope. Blanco (3, 1: 322) also tells us that the folk doctors use this plant in medicine by mashing the prickly leaves and applying it to cancer.

AMERICAN FRUITS IN THE PHILIPPINES

Edible fruits abound in the Philippines, and some of them are the best in the world, offering an attraction to life in the Tropics. Most of these fruits are not native, but introduced, including both mango and mangosteen.

Some of the American fruits, like the guayava and the papaya, are of general distribution and in constant use everywhere, being so common that the casual traveler would think them native to the Islands.

Certainly not least among the Spanish contributions to the culture of the Philippines was its enrichment with many of the most delicious fruits now in use.

ANANAS COMOSUS (Linnæus) Merrill. Piña (Sp.); pineapple.

This is an American plant (5, p. 311) propagated by slips or buds; wild plants capable of producing seed are found only in South America. (10, p. 47) The Brazilian (Tupi) name, *nana*, was changed by the Portuguese to *ananas*, from which its scientific name, and many common names of Africa, India, Malaysia, and Europe derive; only the Spaniards called it *piña* because of the resemblance of its fruit to a pine cone. (31, p. 247) Kircher says that the Chinese cultivated it in the seventeenth century, but it was believed to have been brought from Peru. (5, p. 311)

Although we commonly find that American plants were introduced to the mainland of Asia from the Philippines, in this case the reverse seems to be the case. In 1586 Bishop Salazar reports pineapples among the fruits imported to the Philippines from China. (2, 7: 34) Laufer shows that the Portuguese introduced this Brazilian plant, and the name *ananas*, into Saint Helena in 1502, into India and Malacca by 1550, and into China soon after through Macao. Chinese records of it exist from the beginning of the seventeenth century. (31, p. 247) Thus we see how this American plant traveled eastward and was introduced from China into the Philippines only sixty-five years after its discovery.

In 1667, Padre Navarrete finds the pineapples of Mexico and Manila the same, and is familiar with the *ananases* of Malacca. (2, 38: 50)

In the Philippines this plant preserves its Spanish nomenclature: *pita* (Il.), and *piña* (Sp.-Fil.), except in isolated regions

of little Spanish contact as Bontoc: *apangdán* or *pangdán.*(15, 1: 194) It grows well everywhere and is widely distributed, being esteemed for its delicious fruit and even more for its fiber from which the beautiful gauze fabrics of the national costume are made. These are mostly manufactured in Iloilo and Jaro, whence there is a wide interisland commerce.

PSIDIUM GUAYAVA Linnæus. Guayaba (Sp.); guava.

A shrub or small tree bearing a fruit from which the well-known guava jelly is made. This is an American plant apparently distributed throughout tropical America before the Europeans came.(5, p. 244) Standley gives us this account of its folk-uses in Mexico:

> In Mexico the bark is sometimes used in tanning and a decoction of the buds is a local Mexican remedy for diarrhea. The leaves are reputed to be a remedy for the itch and a decoction of the astringent bark is applied to ulcers and taken internally for pains of the stomach.
>
> It is known generally as *guayava,* a name of Antillean origin.(21, p. 1036)

By 1609 the plant was common enough to merit mention by de Morga;(2, 16: 87) and by 1650 Navarrete says that it was spreading so fast that it was destroying the pasturage due to the fact that the seed is dropped by birds which have eaten the fruit.(2, 16: 87) It is now very common everywhere in the Archipelago; the fruit is commonly made into jelly.

The Filipinos took over some of the Mexican medicinal uses and found or fancied they found others. Delgado writes:

> Eaten green it is an astringent, but very ripe it is a laxative and encourages body worms. The cooked leaves are beneficial for obstructions of the spleen; and for swollen legs when used as a bath. Dried and powdered leaves cure wounds. There is no doubt that the tree has medicinal values yet unknown.(7, p. 515)

Blanco records that the juice of the tender shoots is used to clear up clouds from the corners of the eyes.(3, 2: 178) Tavera vouches for it only by saying that the bark is strongly astringent and a decoction of it is used for diarrhœa and as a wash for ulcers.(19, p. 114)

The nomenclature of this common plant of minor use is valuable for this study, since the value of the tree enables it to carry its Antillean name, *guayaba,* everywhere in the Archipelago. The wide variation of the terms within the pattern indicates a minor importance, but still considerable.

Only the Tagalogs call it *guayába,*(15, 3: 155) as they are near the center of diffusion, but they vary it as far as *kalimbahin,*(15,

3:155) which may be a descriptive term, unlike another term, *tayábas.* (15, 3:155)

Among other Tagalogs, the Visayans of Cebu, Ilocanos, and Ibanags (of the Cagayan Valley) it is called *bayábas.* (15, 3: 155) The Bicols of southern Luzon call it *bayáuas,* (15, 3: 155) a variation greater than another Ilocano term *guyábas.* (15, 3: 155)

Among the non-Christians of northern Luzon, the Ilocano term *bayábas* (15, 3: 155) becomes *bagábas* (15, 3: 155) among the Igorots (of Benguet). Among the Bontocs the term *geyábas* (15, 3: 155) seems to build on the other Ilocano term *guyábas.* (15, 3: 155) Farther off, in Ifugao, it passes along *gaiyábat* (15, 3: 155) or *gaiyábit.* (15, 3: 155)

The pattern carries to the southernmost part of the Philippines, being termed *baibas* (15, 3: 155) in Sulu.

CARICA PAPAYA Linnæus. Papaya (Sp.); papaw.

All species of this family are American. This one seems to have been cultivated from Brazil to the West Indies before the arrival of the Europeans. Papaya derives from the Carib word *abibai.* (5, pp. 293, 94)

The ripe fruit is smooth and yellow, and the inside resembles that of a muskmelon. It is deservedly one of the most popular of tropical fruits and resembles the muskmelon in taste and texture, although sweeter.

It is an extraordinary plant because the fruit and other parts of the plant contain an abundant milky juice containing an enzyme, papain, resembling animal pepsin in its digestive action. (21, p. 582) The strong digestive properties of this plant were known to the ancient as to the modern Mexicans, and upon its introduction into the Philippines the peoples there soon learned them.

The papaya was early brought to the Islands by the Spaniards since it is mentioned by Chirino in 1604. (2, 13: 141) It has deservedly become one of the commonest and most popular fruits in the Islands.

The green fruit is cooked with meat in order to make it tender—a trick every Filipino cook is familiar with. Too much of the fruit will cause the meat to fall into shreds. Some go to the length of saying that it is only necessary to hang meat in a papaya tree in order to soften it. (19, p. 123)

The Filipinos use a cold infusion of the leaves to wash clothes spotted with blood and the spots disappear immediately by virtue of the ferment, papain, which digests the fibrin. The infusion

is useful as a wash for sores and gangrenous ulcers. Small pieces of the green fruit are used to remove freckles.(19, p. 123) The leaves are excellent for the treatment of rheumatism if applied to the afflicted members. Blanco,(3, 3: 212) however, observed that the cure was not permanent.

The leaves serve the washerwoman in place of soap. The crushed leaves will bleach new cloth and clean dirty linen, promptly taking out all stains.(3, 3: 212)

Delgado in 1751 notes the general distribution and the above uses and goes on to observe that "from the shoots of the leaves, which are hollow, the boys make trumpets which sound very pretty,"(7, pp. 520, 21) a note not without ethnobotanical interest.

The nomenclature of this plant in the Philippines patterns very closely around the Spanish word *papaya* as a nucleus, even in isolated regions where Spanish contact was slight, showing the ability of a new trait to carry its foreign name beyond the limits of organized diffusion.

The somewhat isolated Samar and Leyte Visayans vary the term to *kapaya,*(15, 3: 118) which term is carried as far south as Sulu, where it is also varied to *papaye.*(15, 3: 118) The Bicol term is *tapayas,*(15, 3: 118) which is closer to the original, as would be expected nearer to Manila. Even among the non-Christian Bontocs the term does not escape the Spanish pattern in their word *lapaya;*(15, 3: 118) while the non-Christian Subanuns of Mindanao retain the pattern in varying the Sulu term *papaye* to *payyas,*(15, 3: 118)

ACHRAS ZAPOTA Linnæus. Chico zapote (Sp.); sapodilla.

This is a tall tree with wide-spreading branches. The sap produces the chicle of commerce, and the fruits are universally liked. The tree is found wild in the forests of southern Mexico and eastern Guatemala and no one doubts its American origin.(5, p. 286)

Standley, writing of the trees and shrubs of Mexico, says:

> Its name, *chico zapote* derives from the Nahuatl *tzicozapotl* (gum-zapote). The ancient Aztecs were well acquainted with chicle gum which was chewed by the women and children. Figures were also moulded in it. The wood is hard and durable, and is found in the Maya ruins of Yucatan.
>
> The bark is said to produce an alkaloid, sapotine, which is employed in Mexico as a folk remedy for fevers.
>
> This plant has a wide distribution through the tropics and is common in South India and Ceylon.(21, p. 1119)

In the Philippines, it is commonly known as *chico,* also *sico,* (V.) and *tsicu* (T.), obvious corruptions of the Spanish *chico,*

which is the general term in use in the Islands.(33, p. 120) It is cultivated in the Philippines to a considerable extent for its edible fruit. There is a large local production of this fruit near Manila for the Manila market.(40, p. 216) It is commonly seen in the markets and sold by women who meet the passing trains.

The use of the gum—an ethnic complex taken over in toto from the ancient Mexicans by the Americans of the United States—is unknown in the Philippines; although the coming of the American régime brought with it the gum-chewing complex, and in every little Chinese tienda neat packages of American chewing gum are for sale. American chewing gum also has a common sale in Mexico, where it is called *chicles*. This is really carrying coals to Newcastle, or in anthropological terms, reintroducing an old trait in modified form.

By 1751 the plant was common around Manila but not in the Visayas.(7, p. 517) At present it is of general distribution in the Archipelago(40, p. 216) and is a favorite dessert fruit.

ANONA SQUAMOSA Linnæus. Ates (Sp.); sugar apple; sweet sop.

This is a tree 4.5 to 6 meters in height with grayish bark. The fruit, the size of an orange, is heart-shaped with a tuberculate surface. The pulp is yellowish white, creamy, custard-like, sweet, and pleasantly flavored.(21, p. 283)

De Candolle gives a scholarly review of the evidence for its American origin in the West Indies or the neighboring part of North America.(5, pp. 168–73) Cogolludo, in his history of Yucatan, quotes an early source to the effect that the first Montijo expedition (1527) found *anonas* growing in Yucatan. Sturtevant thinks that Mexico or the Amazon Valley is the home of this tree.(10, p. 53) It is widely cultivated in Mexico, where it is known by a variety of names. In southern Mexico it is known as *ahate*, from which is derived the Spanish term *ate*.(21, p. 283)

In the Philippines it is known by variations of this Spanish name: *atis*, *ates*, or *yates*.(15, 3: 177) It was introduced by the Spaniards at an early date, as stated by Chirino in 1604. (2, 12: 216) In 1667, Navarrete writes of *ates*, "which for odor and taste I consider superior to all fruits, which God has created."(2, 38: 50)

By 1751 the tree had become so common on Luzon and Panay that Delgado thought it indigenous.(7, p. 519)

It is universally prized in the Philippines for its edible fruit, but it is commoner in Luzon than in the Visayas, Iloilo excepted.(40, p. 247)

The roots of the tree are sometimes boiled with lye to obtain a faint red coloring.(3, 2: 241)

ANONA RETICULATA Linnæus. Anonas (Sp.); bullock's heart; custard apple.

A small semideciduous tree from 5 to 7 meters high with a brownish yellow, heart-shaped fruit with a pulp that is sweetish, insipid, and tallowlike. It is cultivated in Mexico, and in some places doubtless native.(21, p. 284) It occurs wild in the West Indies and in Central America.(5, p. 174) It is certainly of tropical American origin.(10, p. 52)

In Mexico it is said to have astringent and tonic properties which are used in remedies.(21, p. 284) The young branches have a useful fiber.

In the Philippines it is known only by its Spanish name *anonas*, except in Sulu where it is called *sarikaya*.(15, 3: 177) It was brought from Mexico in the eighteenth century. Delgado writes:(7, p. 518)

> It produces well in Luzon and Visayas, but it is rare, having been brought from New Spain. It has no market value, since only a few foreigners are willing to pay for fruits, except in Manila where there are many Spaniards; so the Chinese purchase the fruit for re-sale.

The fruit in the Philippines has a cream-colored, juicy pulp inferior to *A. squamosa*.(40, p. 221) It is common in Luzon, but scarce in the Visayas and Mindanao.

In some parts of the Philippines a curious superstition still persists about the anonas. In cases of sickness, the local folk doctor ties up the toes and fingers of the patient with anonas bark to drive out the *mangkukulam*, or evil spirits.(2, 43: 314, 15)

ANONA MURICATA Linnæus. Guanabano (Sp.); sour sop.

This tree grows wild in the West Indies, and was early cultivated throughout tropical America;(10, p. 52) and is sometimes naturalized on the continent of South America near dwellings.(5, p. 173) Standley, writing on the tree in Mexico, says:(21, p. 280)

> It is widely cultivated in Mexico where it is called *guanabano*, the West Indian name. The fruit of the sour sop is highly esteemed in tropical regions. It is eaten fresh, used in the preparation of beverages, and made into jelly. Sometimes, in Mexico, it is fermented to produce an intoxicating drink.
>
> There also the seeds, and green fruit, being astringent, are used as a remedy for dysentery.

The tree is valued in the Philippines for its fruit, which is eaten fresh or made into preserves. It is the most widely cul-

tivated species of the genus.(40, p. 225) The very large green fruit is covered with long soft spines. The flesh is white, rather fibrous, juicy, pleasantly acid, and of good flavor.

The medicinal properties of this plant did not escape the Filipinos. Here the unripe fruit is also used to treat dysentery, though the ripe fruit is used for diseases of the liver.(19, p. 22) Blanco says,(3, 2: 242) "Dr. Chevalier assures us that there is no better cure in Europe for diarrhœa and dysentery than this *anona*."

The roots are boiled with lime by the natives to secure a faint red dye.(3, p. 242)

In the Philippines it is known by variations of its Antillean name, *guanabano*, introduced with the plant by the Spaniards. The Tagalogs use the true term *guanábano*(15, 2: 177) and vary it to *guayábano*, *guyábana*, or *guiábano*.(15, 2: 177) The last term carries to the Zambales.

The name failed to carry to all the Ibanags of Cagayan Valley for they call it *attí*,(15, 2: 177) a variation of the common term for the similar *A. squamosa*. Some of them, however, use the Ilocano term *gayubáno*,(15, 2: 177) which is evidence of early cultural contact, now so prominent between these two peoples. Another Ilocano term is *bayubána*.(15, 2: 177)

When the term leaves Luzon, it becomes more and more mutilated. On Panay it is corrupted to *babána*,(15, 2: 177) and another Visayan term is *llabanos*(15, 2: 177) (yabanos).

In Sulu this Visayan word, like a battered coin still showing traces of its mintage, *guanabano* becomes *labanus*.(15, 2: 177) This variation of the Visayan word is valid testimony of a great deal of history. Most of the contacts of the Mohammedan Moros of Sulu with the rest of the Philippines have been slave and piratical forays so that *bisayan* in Sulu is a word meaning slave. Since the introduction of steam gunboats by the Spaniards in the nineteenth century, this has changed, and the contact is now Moro trading vintas, which are still seen in Cebu and Iloilo. Hence it is not surprising that the Sulu word for this *anona* is varied from the Visayan.

PITHECOLOBIUM DULCE (Roxburg) Bentham. Quamuchil (Mex.-Sp.).

This is an American tree native on the west coast of Mexico and Central America, whence it was introduced into the Philippines, and from there into India where its fruits are known as Manila tamarinds.

Its seeds are considerably used by the natives of the west coast of Mexico, where it is sometimes planted for its fruit. It is

found throughout tropical Mexico, where it is apparently native. The men and boys gather the pods by the basketful. The large fleshy aril which surrounds and hides the seeds is eaten raw, being crisp, sweetish, and very palatable. (35, p. 216)

The bark yields a yellow dye and is also useful in tanning, and has local medicinal use because of its astringent properties. The gum exuding from the bark makes good mucilage. In Mexico the plant is called *huamuchil* or *guamachil* from the Nathuatl *quamuchitl.* (21, p. 392)

In the Philippines, where it was early introduced, the fleshy aril surrounding the seed is everywhere eaten, as in Mexico; (33, p. 176) and the bark is extensively used in tanning leather. The wood is commonly burned to make charcoal.

Among the Tagalogs near Manila the Aztec word *quamochitl* is retained with a slight variation, though considerable variation would be expected upon introducing so foreign a name as Aztec into Philippine linguistic patterns. Tagalog words for this plant are: *kamachíle, kamachílis, kamasíli kamarsílis, kamatséle,* and *kamonsíles.* (15, 2: 2243)

At some distance from Manila, in contact with the Tagalogs in southern Luzon, the Bicols use a Tagalog variation, *kamachíli.* (15, 2: 243) The term, in reaching Cagayan Valley in north-central Luzon, among the Ibanags takes on a *ra* infix, becoming *ka-ra-mansíli.* (15, 2: 243)

The Ilocano word *kamantiris,* having substituted a "t" for "s" from the Tagalog, becomes a fertile nuclear word which was dispersed into northwestern Luzon. Among the non-Christians of the western cordillera, Ilocano linguistic influence is very strong due to trade between the mountains and the Ilocano coast. This influence is seen in the Tinguian group—a geographical intermediary between the Ilocanos and the Igorots. Here the plant is called *komóntos,* a close variation from the Ilocano *kamantiris.* (15, 2: 243) The Igorots of Benguet miss it farther in saying *chamúltis,* and it varies still more in *damúlkis* of the Bontocs. (15, 2: 243) This is a direct geographic and linguistic chain from Aztec *quamochitl* to faraway Bontoc *damúlkis.*

When the Tagalog word *kamansíle* leaves Luzon it changes on Panay (Visayan) to *komonsíli* and *kamúnsil,* (33, p. 176) in keeping with the strong cultural interchange we know existed between these two islands. Another Visayan word, *kamonsil,* (15, 2: 243) still falls within the pattern.

This extraordinary diversification in nomenclature in the Philippines for this Mexican plant is very illuminating to the student

of culture because of the relative unimportance of the plant. While the fleshy aril surrounding the seed is everywhere eaten in both Mexico and the Philippines, this use is only casual and nowhere becomes important. The uses of the plant as a dye, for tanning, and as a medicine are minor.

Thus it shows not only an interesting philologic variation, but shows also the inability of an unimportant plant to carry a new name unmodified into new patterns in contrast to the unmodified American nomenclature of important plants like the camote, tobacco, corn, etc.

CALOCARPUM SAPOTA (Jacquenot) Merrill. Chico mamey (Sp.); marmalade plum.

This tree is found wild in southern Mexico, Central America, and on the banks of the Orinoco, and is cultivated in the West Indies and in tropical America generally.(15, p. 286) Sturtevant gives its origin as the West Indies and South America where it is known as *mammee.*(10, p. 340) Standley writes:(21, pp. 1120–22)

> It is a tree cultivated for its edible fruit. It is widely distributed in the warmer parts of Mexico and its fruit is highly esteemed by the Mexicans, though others must cultivate a taste for it. The fruit is often made into jelly. The handsome seeds known in Mexico as "pizle" or "pixtle" are in some places mixed with cacao and parched corn in the preparation of a beverage called "choue" by the Indians. There is a common belief in Mexico that the oil from these seeds will restore fallen hair and the Aztecs used it in hairdressing.
>
> In southern Mexico it is called "tezon-zapote" (lava zapote) from Nahuatl *tezontzapotl.* In this language *tzapotl* (Sp. zapote) is a general term for sweet fruits, while *xocotl* (sp. jocote) is used for sour.

The plant is known in the Philippines by an introduced Spanish name *chiko-mamei* or *mamei.*(15, 3: 284) It was introduced rather late in the Spanish régime, for by 1751 it was still rare in the Visayas;(7, p. 516) however, a century later it was so common around Manila that Blanco thought it indigenous.(32, p. 34) To-day it is seen only occasionally planted in Luzon—in Cavite and Laguna, etc., near Manila, the center of diffusion of the American plants.

The fruit is similar to the chico (*Achras zapota*) but about 5 inches long.(32, p. 34) It is like a very large oblong chico in appearance. The pulp somewhat resembles thick reddish brown marmalade, and is sweetish and aromatic. It is now cultivated mainly in Cavite and Laguna,(40, p. 216) but is not a common fruit throughout the Archipelago.

SPONDIAS PURPUREA Linnæus. Ciruelo (Sp.); hog plum.

A small spreading deciduous tree about 6 meters high, cultivated for its edible fruit, the size of a small plum, a little longer than broad. It contains a large seed, but the fruit is of good flavor and is eaten as a dessert fruit in the Philippines.(40, p. 217) It is widely distributed in Mexico and tropical America, where it is native.(21, p. 656) It is called *ciruela* (Sp. plum) in Mexico.

In Mexico large quantities of the fruit are eaten raw or cooked. It is also used for beverages and intoxicating liquors. The fruit is reputed to have diuretic and antispasmodic properties. (21, p. 656)

In the Philippines it is universally known by corruptions of the Spanish name. The Tagalogs keep closest to the Spanish word *ciruéla* when they say *sirihuélas,*(15, 2: 471) which the nearby Bicols take over as *siriguélas.*(15, 2: 471) Another Tagalog term is *sineguélas.*(15, 2: 471) In Ilocos the term gets farther from the prototype in *saguélas* and *sarguélas.*(15, 2: 471) This last may have influenced the Ibanag *saraguelas,*(15, 2: 471) especially in view of the ecclesiastical organization of Ilocos and Cagayan Valley as the bishopric of Nueva Segovia.

According to F. Villar,(32, p. 22) it was introduced into the Philippines in the eighteenth century.

Blanco tells us that the fruit, though astringent, is eaten, and used medicinally in treatment of dysentery. The nut, he reports, is poisonous.(3, 1: 143)

DIOSPYROS EBENASTER Retzius. Sapote negro; persimmon.

A large, wide-spreading tree producing a rather large smooth fruit, the pulp of which is black and soft.(21, p. 1128) This plant is now known to grow wild in Central America. It is mentioned in Mexico by the older writers, and Merrill states that it was carried to the Philippines from Mexico during the early colonial period.(15, 3: 291)

The tree was described in Mexico by Hernandez, under the Nahuatl name *tliltzapotl* (black zapote) and used by the Indians as a remedy for leprosy, ringworm, and itch, as well as for killing fish in streams.(21, p. 1128)

Its Nahuatl name is hispanicized in southern Mexico into *zapote negro,* by which name it is known in the Philippines,(7, pp. 517, 18) or simply as *sapote.*(40, p. 252)

The natives of the Philippines rarely cultivate it for its edible but inferior fruit. It is one of the rarest fruits in the Islands; hence, the paucity in nomenclature.

The green fruit is used to poison fish. The leaves, and even more so the bark, serve as a caustic. (3, 2: 29) The wood is one of the ebonies.

AMERICAN MEDICINAL PLANTS IN THE PHILIPPINES

A discussion of the important subject of folk medicine in the Philippines is not within the scope of this paper. Suffice it to say that there is no Philippine village without its *curadero*.

In connection with the rites and ceremonies used by some of these curaderos they often have a considerable practical knowledge of the properties of medicinal plants, which they often use to advantage. In Binondo Square in Manila there long has been a market for native drugs.

It will be obvious to the reader that, in general, the Filipinos use the American medicinal plants in much the same way, and for much the same purposes, as they are used in Mexico. Nor is the reason far to seek. From the writings of Blanco, Delgado, and other friars, it is clear that many of these plants were definitely introduced as medicinal plants and that the properties known in Mexico were taught to the Filipinos.

JATROPHA CURCAS Linnæus. Sangre grado (Sp.); physic nut (West Indies).

Of this plant in Mexico, Standley says: (21, p. 640)

A shrub or tree from 1 to 6 meters high with greenish yellow flowers. It is commonly cultivated in Mexico as a hedge plant since the branches take root quickly and stock does not eat it. It is reported that it gives a purple dye. The seeds contain from 25 to 40 per cent of an inodorous oil, easily extracted by pressure. It has been employed in Mexico as an illuminant in soap-making, lubrication and in paints. The seeds possess drastic purgative properties.

It is one of the commonest fence plants on the west coast of Mexico, where it is used as a physic. (35, p. 229) Hence it is easy to see why it was introduced into the Philippines, with all its uses, since Philippine commercial relations were with the west coast of Mexico.

In the Philippines it is one of the most widely distributed American plants and commonly cultivated as a hedge. (33, p. 160) The milky sap of the stem and leaves, as well as the seeds, yield a drastic purgative; (32, p. 27) indeed, too drastic for safety. (19, p. 215) The seeds yield 25 to 40 per cent of a yellowish oil, more active than castor oil. Mixed with water it is used as a

wash for atonic sores. Up to 1890 the oil was exported to Europe for purposes of illumination and adulterating soaps, and for candles.(19, p. 215) The roasted seeds are good to eat.

Blanco(3, 3: 159) in 1837 records its use as a hedge, and its abundant oil extracted for use in lighting, especially in Ilocos, as it lasts longer than coconut oil. A decoction of the leaves is used in fixing the red or blue dye in thread.

Blanco gives another interesting use of this plant. The children stir up the oil until it is foamy, and then blow bubbles through small reeds, as youngsters in Europe do with pipes, soap, and water. This is a simple, naïve, but excellent example of what the anthropologists mean by "parallel development."

Despite the general distribution, and the past use and importance of this plant, its nomenclature shows no trace of American influence. Its general name *tuba,* which has a wide distribution in the Visayas, and among the Tagalogs, Ilocanos, and Igorots, is derived from its property of stupefying fish in ponds and sluggish streams.

The plant carries a variety of other names. The Tagalogs use: *kirisól*;(15, 2:449) *taba-tabá, tañgan-tañgan-túba,* and *tubang-bakód.* In nearby Pampanga the dialectic term is *galumbam,* which varies to *tagumbáu* among the Ilocanos, and *takumbau* among the Zambals. Other Ilocano terms are *tagumbau nga puraú* and *tauuá.* The Ilocano term *taua-tauá* is reported from the Igorots, which is not surprising in view of the contacts we know exist between them. Another term for Visayan dialects is *kasla.*

CASSIA ALATA Linnæus.

This is a small shrub with yellow flowers and angular winged pods. Though cosmopolitan in the Tropics, this plant was probably introduced from Mexico and is extensively used in the practice of folk medicine.

Cassia alata provides one of the most popular native remedies and its usefulness is vouched for by physicians. It is a cure for herpes when the juice of the plant is applied locally to the affected part.(19, p. 103) It is commonly used for this purpose and is called *gamot sa buni* (remedy for herpes), which is a common tropical skin disease.(3, 2: 77) It also has the virtue, and is commonly used, to cure itch and ringworm as Delgado proved to himself by application of the leaves well crushed. (7, p. 617)

The American origin of this plant, and even its port of departure for the Philippines is preserved in a common Philippine

name for this plant: *akapúlko,* or corrupted to *kapúrko.* In nearby Pampanga the reference is less correct, *pakayomkom-kastíla,* while farther away in the Visayas the geography is badly off, *palo-china* (Chinese stick); yet both terms show the nomenclature indicating the foreign origin of the plant.

The value of this plant as a folk cure for herpes did not prevent its assuming a local nomenclature in many regions. The Tagalogs call it: *bayabásin, bikas-bíkas,* as well as *gamót-sa-búni* (cure for herpes), *katánda, pakagonkin,* and *soonting.* This term varies in the Visayas to *sunting.* In the Bicol region of southern Luzon the term *kasítas* is used.(15, 2: 262)

In Sulu the term *andalan* is reported, although the Spanish *akapulko* was also introduced. The Subanuns of Mindanao say *kapis,* while the Bogobos say *buni-buni.*

The Ilocano term influences the nomenclature of the non-Christians of Luzon, commerce having made that dialect a sort of lingua franca in that region. Ilocano terms are: *andadási, andadási-a-dadakkel,* and *andadasi nga bugbugtóng.* The Tinguians who are situated between the Ilocano coast and the mountains use the first words *andadasi,* while the Igorots beyond say *ancharási.*

CHENOPODIUM AMBROSIODES Linnæus. Alpasotes (Sp.); ezapote (Mex.).

This is an aromatic herb introduced to the Philippines from Mexico,(33, p. 135) where it is called *ezapote*(10, p. 160) from the Nahuatl, *epazotl,* meaning skunk, since it has an extremely nauseating odor. This *epazotl del zorrillo* (*zorrillo* is the Spanish word for skunk, giving this term the meaning "skunk of skunks") is a folk medicine in general use among the Mexicans, being taken in the form of tea to cure colic, pneumonia, and other ills.

It is an official drug of the United States Pharmacopoeia for expelling intestinal parasites, and has lately found important use in treating hookworm. The plant is a common weed in many parts of the United States.

Of its use in the Philippines, Padre Mercado(19, p. 202) records:

> When the seeds are taken with wine, sensation is so dulled that the drinker may be whipped without feeling the lashes and even when put to the torture does not feel it.

Under the Spanish régime the Filipinos had considerable opportunity for testing this property of the plant which the Spaniards were thoughtful enough to provide.

Blanco (3, 1:253) adds to our knowledge of the use of this plant in recording that the Filipinos eat it when cooked. The whole plant causes sweating, urination and menstruation, and is very useful in asthma and pulmonary catarrah. The cooked root is said to cure fever when taken two or three times. It has a *very strong odor that first pleases and then tires.* It is said to preserve books from maggots—if so it should be much appreciated in these Islands.

In the Philippines it is known by various corruptions of its Spanish name *alpasótes: aposótis, apasóte, aposótis, pasótis,* and *parsótis* are reported (15, 2: 125) for all the Christian peoples. With historical data lacking this would indicate that this valuable medicinal plant was actively diffused by the Spanish missionaries who were especially interested in folk medicine, since they had but little other available. Such an inference is clearly verified by the divergent nomenclature among the groups which were never brought under the bells: *libug* in Ifugao; *adlabón* among the Igorots, presumably of Benguet; and *bulbúla* in Bontoc. (15, 2: 125) All of these groups are in geographic contiguity, but are peculiarly isolated from cultural contact due to head-hunting in past times.

EUPATORIUM TRIPLINERVE Vahl.

An aromatic herbaceous plant, native of Brazil. (33, p. 253) Standley says of its use in Mexico: (21, p. 1433)

It is of little economic importance, but some species are used in folk medicine. At least one species is aromatic and used in flavoring tobacco.

Shortly before 1837 this species was introduced into the Philippines because of its reputation for medicinal properties in the treatment of bites of insects and snakes; according to Blanco: (3, 3: 8)

This marvelous plant has been talked about so much in the last few years and has marvelous virtues for a multitude of ills. It is said that its crushed leaves applied to the bites of snakes and insects will immediately cure. For bites they also drink a decoction of the leaves to induce sweat. Over the wound are placed the crushed leaves covering all with a cloth, well moistened with the decoction of the plant. This can be drunk with no unpleasant effects.

It propagates rapidly in this climate, and is cultivated by the curious.

In 1898 a more-competent scientist, the Filipino scholar, Pardo de Tavera, says: (19, p. 150)

Its infusion has an agreeable, bitter taste and is a good stimulant, disphoretic and tonic. It is used internally and locally for the bites of venomous snakes and insects. Although its virtues have been greatly exaggerated, it has in general fallen into unmerited neglect.

At present it is planted occasionally for medicinal purposes but is nowhere spontaneous.(15, 3: 598) The plant is known by variants of its Brazilian name, *apána* or *ayupána*, among the Tagalogs,(15, 3: 598) and *inpana* among the Ilocanos.(15, 3: 598) Its limited use and distribution probably accounts for the paucity of nomenclature.

ASCLEPIAS CURASSAVICA Linnæus.

An herb, a member of the milkweed family, with milky sap, red and yellow flowers, introduced to the Philippines from America, and common in the Islands.(33, p. 126) It is one of the abundant and generally distributed weeds of tropical America.

Standley gives this information about the plant in Mexico:(21, p. 1168)

> Numerous herbaceous species of the milkweed occur in Mexico, where the juice is used locally as a drastic purgative, but it is dangerous. Palmer reports that in Durango, the leaves are applied to the temples to relieve headache.

Merrill(15, 3: 341) says that this plant is found "throughout the Philippines in the settled areas, and in open waste places in and about settlements, ascending to at least 1,500 meters."

The Philippine nomenclature is considerable, and one suspects largely descriptive. Tagalog incorrectly indicates its foreign origin by *bulak-kastíla*, Spanish cotton (apparently because of the cottonlike appendages to the seeds); while the term in nearby Pangasinan shows a more-confused geography, *kapös de francia* (*kapos* or *kapok* for tree cotton, *Ceiba pentranda*, of France).

From these terms the local nomenclature varies into a complexity of forms without any American pattern. The Tagalogs also use these terms: *kala láuan; bubuyan; bulak-bulákan; bulak-damó; bukitkit; kamantíging ligaú;* and *kapol-kapol.* The Bicols use *koronítas.* In Panay the Visayan term is *ligurias.* The Ilocanos use *sabsabrong;* and the nearby non-Christian terms show no relation to it, *anibung* and *pasanglai* in Bontoc; and in Ifugao *balihig.* The Subanun non-Christians near Zamboanga say *kambang-datu. Punganen* and *dadal* are terms reported from the Ivatan, at the other extremity of the Archipelago in the Batanes.(15, 3: 341)

The medicinal uses of this plant were taken up in the Philippines where it was known that the juice that escapes from the slightest abrasion is a drastic purgative. It is also used by local medicine men to cure dropsy. Packed in the cavities of teeth it relieves toothache and is locally applied for skin diseases and syphilis, and is used as a depilatory.(19, p. 168)

ARGEMONE MEXICANA Linnæus.

This member of the poppy family is an herb with large yellow flowers, spiny leaves, and no yellow sap. It was introduced from Mexico to the Philippines.(33, p. 125) In Mexico there are several species known by the vernacular names *chicalote* and *cardo-santo.*(21, p. 299)

The flowers are narcotic by virtue of a principle resembling morphine, and are used by the Filipinos in treating scratched eyes, according to Blanco.(19, p. 168)

About this plant Merrill says it is found, "in and about towns, a weed in waste places, widely distributed in the Philippines." (15, 2: 207) It is known by its Mexican name *chicalote;* but among the Tagalogs has usurped the name *diluáriu,*(15, 2: 207) because of the similarity of its leaves to *Acanthus ilicifolius.* Among the Ilocanos it has usurped another name, being called *kachúmba,*(15, 2: 207) a Sanskrit name carried to the Philippines from India by the plant *Carthamus tinctorius,* the leaves of which resemble those of the American plant under discussion. Another Ilocano word is *kasúbang-áso.*(15, 2: 207) On Panay we find the Visayan word *kagang-kágang.*(15, 2: 207) In the Batanes Ivatan gives this plant the name *baruás.*(15, 2: 207)

Here we see a common weed of general distribution and some folk-value carrying with it its American name, but soon losing it for descriptive terms. Because of the similarities of the leaves of this plant to other plants, it has usurped their names, one of which is a Sanskrit word brought from India.

AMERICAN MONEY CROPS IN THE PHILIPPINES

INDIGOFERA SUFFRUTICOSA Miller. Indigo.

Standley gives this account of this plant in America:(21, p. 440)

A shrub occurring nearly throughout Mexico; widely dispersed in tropical America; and adventive in the Old World. It is generally known in Spanish America as *anil* or *Jiquelite* from the Nahuatl *xiu-quilitl* (turquiose herb). The use of this plant for a dye was known to the aboriginal inhabitants of Mexico. In addition, the plant was much used in domestic medicine.

It was introduced into the Philippines from Mexico in the eighteenth century and is known there as: *tagum-tagum* (V.); *tayum* (T.); and *anil.*(33, p. 159) In 1751 Delgado records that the women dye cotton and abacá (hemp) cloth. A little fine lime fixes it so well that it cannot be washed out.(7, p. 733)

In the next century it became an important plantation product and a considerable native industry was based upon it. In 1837, Blanco (3, 2: 292) gives us this account of the native industry:

> The natives plow the soil twice and plant the seed in November when there is little rain. They harvest at the end of July, taking off the fruit as it ripens. The plants regerminate promptly and reproduce four times without a new planting.
>
> To extract the blue dye they prepare a tub or vat of wood about 7 feet high, which is filled with cold water. The plants and leaves are put in in the morning and are left until the following day until the water becomes apple-green. Then they take out the plants.
>
> Then they put in a quantity of lime and stir the water until it takes the desired color, which requires about half an hour. Then it is allowed to rest until it settles and becomes clear.
>
> Then the vat is tapped and the liquid run off. The sediment is then taken out and put in a small pit and the water disappears from it immediately. It is then put in clay vessels and each is sold at from three to eight pesos. This is the method that the Indians use to make *lodo* or tintarón. It has good sale in the Islands and in China.

With the appearance of coal-tar dyes the industry disappeared here as elsewhere.

THEOBROMA CACAO Linnæus. Cacao.

This well-known plant is wild in the forests of southern Mexico and Central America. It was cultivated in the warmer parts of Mexico in preconquest times and is now distributed over all tropical lands. (21, pp. 805–8) In Mexico, Cortez was given chocolate by Montezuma, and the beans were used as money among the Aztecs. (10, p. 569)

The words *cacao, cocoa,* and *chocolate* derive from the Nahuatl word *cacahuatl.* The name also is applied to the peanut in Mexico because of an evident resemblance to the cacao bean; the peanut was a pre-Columbian introduction into Mexico that lost its Brazilian name, *madubi,* en route.

Standley gives an excellent account of the uses in ancient Mexico of this important plant, to which the curious reader should refer, since within the scope of this paper the writer can excerpt only a paragraph. (21, pp. 805–8)

> The original inhabitants of Mexico sometimes ate the seeds either green or dry; but the seeds were used chiefly for the preparation of a drink known as "xocoatl," this being the word from which our word chocolate derives. The word signifies "sour water," the unsweetened decoction of the seeds being unpleasantly bitter. The drink as prepared by the Mexicans was different from the chocolate as now usually prepared. It consisted of a strong decoction of the seeds flavored with chile, maize, honey, ceiba seeds, and many other substances, and the beverage was beaten into a foam

which dissolved almost imperceptibly upon the tongue. It was often colored with *Bixa orellana*"—(this plant was also introduced into the Philippines, but this use is not recorded there.)

It was the favorite drink of the Mexican nobility, who consumed immense quantities of it. It was a favorite also of the emperor, for whom almost incredible quantities were prepared every day.

A drink still much used in some parts of Mexico is "chilate," in Nahuatl *chilatl*, (chile-water, or *chilcacohuatl*) which is made from cacao, chile and water. Similar drinks are also prepared by the addition of other substances.

This plant made a great impression on the excited minds of Renaissance Europe and its use became the fashion. Guilds of chocolate mixers grew up, that often mixed it with peanuts. To the Philippines the Spaniards brought considerable lore with the plant. However, the Filipinos promptly mixed toasted rice or coffee with the cacao in preparing the beverage.

In the Philippines it is known only as *cacao*.(33, p. 35) It was introduced into the Islands about 1670, though there are two different accounts for the event. Delgado quotes Murillo Valverde who says that it was introduced in 1665 from Mexico by Governor Diego Salcedo at the instance of the Jesuit Juan de Avila.(7, p. 564) Blanco cites Gaspar de San Agustin, who says that it was brought by a pilot from Acapulco in 1670.(3, 2: 401–3) He says:

The plant was cultivated in Lipa, Batangas, in 1674, and in this province the best plants were raised up to 1830 despite the earthquakes and violent storms.

The natives plant the seeds in a small plot of ground or also in the leaves of trees, doubling each leaf into the form of a funnel with a little earth inside, which is watered from time to time, until it sprouts even in the house. Then they transplant the plants to the desired place, opening for each plant a hole a handsbreadth in depth. They also took care to plant also bananas or *achiote* (Bixa orellana) to shade and protect the cacao. They water the new plants from time to time and in three years they bear fruits. The seeds are planted 6 feet apart and the ground is kept clear of weeds.

The fruits are picked before they are ripe.

The natives have already made great use of the cacao for many of them drink chocolate. For this they mix one-eighth part of toasted rice or more and prepare a chocolate that is very palatable. Others add toasted coffee.

The plant had an extraordinarily wide and rapid diffusion in the Philippines. Writing in 1751, Delgado says:(7, p. 564)

The plant has done well in these islands and we no longer have to send to Mexico for it. Almost all the Visayans plant it and in Mindanao the Moros bring it to Dapitan to sell because there is much of it around Lake Malanao (Lanao). The Subanos (river people) who inhabit the rivers of

Mindanao gather much cacao and transport it to Manila where it finds a ready market.

Although the quality produced is good, even at the present time the cultivation is primitive with little or no attention paid to the fungus and insect pests to which the plants are susceptible.(32, p. 35) By 1915 the cultivation had dwindled to 1,169 hectares.(40, p. 21)

GLIRICIDIA SEPIUM (Jacquenot) Steud. Madre de cacao.

This is a tree distributed throughout Mexico where it is called *cacahuanano* from the Nahuatl *cacahua-nantli* (cacao-mother). It is a favorite shade tree for coffee and cacao.(21, p. 482)

It was introduced into the Philippines in the eighteenth century for the same purpose and for which it is still used, being cultivated in many cacao plantations. It has become spontaneous in many localities and is of general distribution.(32, p. 31)

In the Philippines this plant bears the same name as the Mexican word for peanut, *kakauati*, an interchange of terms that involves a great deal of history and historical reconstruction.

The Philippine nomenclature of this plant, the humble handmaiden to the "Drink of the Gods," the Mexican *cacao*, embalms much pre-Columbian history in far-away America, which is here briefly recapitulated.

In ancient Indian Mexico *cacao* was of such importance as to have firmly patterned its nomenclature about the Aztec word *kakahuá*, or *kakauáti*.(15, 2: 281) When that useful plant the peanut arrived in Mexico its resemblance to the cacao caused the Aztecs to call it *tlalkakauatl*, and as *cacahuate* (Mex.) the peanut is known all over Mexico.

In the conquest of America the Spaniards encountered the peanut elsewhere, obviously at some point where, in its migration from Brazil, it has modified its Brazilian name *mandubi*(5, pp. 411–13) to *mani*, which term the Spaniards took up, rather than the Mexican term *cacahuate*.

Upon the introduction of the peanut into the Philippines by the Spaniards it carried its Spanish name *mani*,(4, 2: 283) which is still the commonest term. However, due to the constant contact with Mexico, the Mexican term, *cacahuate*, could not be kept out. Still it is less common than the Spanish term *mani* in Philippine nomenclature.

When the key plant, the cacao (*Theobroma cacao*), was introduced into the Philippines by the Spaniards, it dropped its

Aztec word *kakahuatl* completely; and now it is known by its hispanicized form *cacao* everywhere in the Islands.

However, for the handmaid of the great cacao, the "mother of cacao" under discussion, the original word for cacao trails along and appears as *kakahuati*(15, 2: 281) in the Philippines, which is also the less common name for the peanut.

This explanation of the stealing of the Aztec term for cacao by both the peanut and the "mother of cacao" in the Philippines illustrates the conservatism of plant nomenclature in cases when an introduced plant is culturally important in its new habitat, and shows the utility of plant nomenclature as a tool for historical reconstructions to bridge over gaps where better data are missing.

Let us examine what happened to our Aztec word, *kakauati*, upon introduction into the Philippines and applied to the "mother of cacao" instead of her famous daughter. The plant is commonly called from the Spanish *madre de cacao*,(15, 2: 281) but the Tagalogs keep the original Aztec in *kakauati*. They seem possibly to have mixed and combined the terms in *marikakáu* (15, 2: 281) (*Maria*, Mary, and *cacao* Sp.).

This term proves especially conservative, for it carries as far north as isolated Bontoc as *kakaoati*,(15, 2: 281) possibly as an important shade tree for coffee which is common at that altitude. The term carries its cacao element as far south as Sulu in *mandiri-kakaú*.(15, 2: 281)

Only once is a local term reported for this plant; among the Tagalogs it is also called *balok-balok*,(33, p. 153) a transfer of names from the remotely similar plant *Pongamia pinnata*.

HEVEA BRASILIENSIS (HBK.) Muell.-Arg. Para rubber.

Rubber is undoubtedly the most useful nonfood vegetable substance in modern civilization. Apparently its use and properties were unknown to white men until the discovery of America brought to their attention its use among the Indians, which is a cultural contribution of capital importance.

So valuable has the substance become that a world-wide search of the Tropics for plants that bear this latex has revealed many kinds of latex-giving vines and trees; but none yields so excellent a product as *Hevea brasiliensis*, although other American species are also common.

Columbus found that the natives of Haiti possessed among other amusements a game of ball. "The balls were of the gum of a tree, and although large were lighter and bounced better than the wind balls of Castille."(13, p. 3)

The latex-producing tree (*Castilloa elastica*) was described by Juan de Torquemada in Central America where it was called *ulequahuital*. It was held in high esteem by the natives, the latex being allowed to coagulate in calabashes or simply smeared over the bodies of the collectors. The rubber so prepared was used in making balls or for shoes for tumblers or jesters whose antics it assisted. A medicinal oil was extracted from it. The Spaniards used the latex to waterproof their cloaks.(13, p. 3)

The first accurate account of Para rubber (*Hevea braziliensis*) was given by G. M. de La Condamine, who visited the Amazon country in 1735. He describes various uses of rubber among the Omaguas Indians, including that of making syringes or squirts which had an important place in social gatherings and religious festivals.(13, p. 3)

Erland Nordenskiold(17, p. 184) gives the classic references to syringes in South American culture and shows that the aborigines also invented the use of the enema, which was adopted by the Portuguese, who carried its use to Europe and Asia. The Indians used the enema-syringe not only as a medicine but also as a mode of taking an opiate *parica* from the seeds of *Piptadenia*. So taken it produces the blissful intoxication of opium and may have been used as an anæsthetic in trepanning.

To the present time the native workers among the wild rubber trees of Brazil are called *serigueros*.

In England, Priestly, the discoverer of oxygen, found that the gum would erase pencil marks, hence its common name, rubber. (18, p, 5)

The first English patent was for its use as waterproofing, taken out in 1791. In 1839 an American, Nelson Goodyear, discovered the process of vulcanization by combining rubber with sulphur. Since then it has come to play its important rôle in modern civilization.

Sherman, in an excellent monograph,(37, p. 1) shows that in parts of the Philippines there occur vines [*Parameria barbata* (Bl.) K. Schum., and others] that produce a good grade of rubber. The people of Tawitawi (southeast of Jolo) know its commercial value and collect it for sale in Borneo.

In Mindoro the vine is known as *ductung ahas*, apparently *ductung*, to cut, and *ahas*, snake; arising from the curious belief that if a snake is cut in two and smeared with the latex, it will recover.

The only so-called rubber trees in the Philippines prior to the American occupation was the beautiful India rubber tree (*Ficus*

elastica), which was introduced throughout the Archipelago by the Spaniards as ornamental shade trees rather than as rubber producers.

Realizing the economic value of rubber, the Government of the Philippine Islands sent Dr. P. L. Sherman to the rubber-producing countries of Malaysia in 1902. He introduced *Hevea brasiliensis* in the Philippines where it was found to grow with great success. Researches since that time have shown that Mindanao offers ideal natural conditions for the production of rubber on a large scale. On the nearby island of Basilan there have been rubber plantations in production for many years.

MISCELLANEOUS USEFUL AMERICAN PLANTS

BIXA ORELLANA Linnæus.

A shrub or small tree, 2 to 9 meters high, having a prickly pod containing numerous seeds with a fleshy, bright orange covering. From its fruit is obtained the *annatto* of commerce for coloring cheese and butter and silk. It was introduced from America and is common in the Islands but has no commercial value.

It is indigenous in tropical America, where it is used for coloring cooked rice, and was one of the first plants transplanted to southern Asia and Africa. (5, p. 401)

Standley gives us this information about the plant: (21, pp. 835, 36)

> The name *Bixa* comes from the native name *bija*, or *bixa* in Panama, while the specific name *orellana* was given in honor of Don Francisco Orellana, the disloyal but famous captain of Pizarro, who achieved one of the most remarkable explorations in history in the descent of the Amazon from its headwaters.
>
> The plant has had wide usages among primitive peoples. It was used extensively by the Indians of Mexico, Central America and the West Indies for painting their bodies, partly for ornament and also for protection against mosquitoes and other insects. It was early introduced into the Pacific islands where the natives soon learned to use the dye in the same way.

In the Philippines a less picturesque and much less primitive use was made of this dye. Pardo de Tavera, (19, p. 32) at the end of the nineteenth century, writes: "Everyone knows the yellow color that Filipino cooks impart to almost all their dishes by this plant." Even this use has largely disappeared.

The Tagalogs still preserve the Mexican word closely in *achóte*, (15, 3: 103) but vary it considerably in *atseuéte* and *asuíti*. (15, 3: 103) The commonest word in the Archipelago is *achuéte*,

which extends to the Tagalogs, Bicols, Zambals, Ilocanos, and the Panay Visayans, keeping close to the original name.

In the Visayan islands this general term did not reach Cebu, where *sótis* (15, 3: 103) represents a new variation from the original. In more isolated Samar and Leyte this becomes *chótes*, (15, 3: 103) due to contacts with Cebu, their nearest Visayan neighbor.

In Sulu it is possible that *chotes* is the prototype for the local word *chanang*, which varies to janang. (15, 3: 103) These words are quite unrecognizable from their Mexican original.

Nearer Manila the Mexican word is carried with little variation to the Tagbanuas of the interior of Palawan where it is known as *achoéte*.

This extraordinary variability of nomenclature clustering around the Mexican name *achiote*, means something interesting to the student of culture. Historic and ethnographic data are quite lacking. What reconstruction may properly be attempted, with the little botanical and comparative material available?

Merrill says of this plant that it occurs "in and about towns throughout the Philippines, usually planted, but at least persisting after cultivation has been abandoned." (15, 3: 103) This shows that the plant had sufficient folk-use to have been distributed everywhere by man, a usage important enough to cause the plant to keep its American name within great variation.

The only historic material available about the Philippines comes at the end of the nineteenth century, when Pardo de Tavera writes of its use for coloring food. Even this use has largely disappeared.

Plenty of comparative materials have been summed up by Standley in the quotation on the preceding page, and in view of this indirect evidence, the patterns of nomenclature for this plant in the Philippines force the conclusion that these varied uses once played a part in Philippine culture.

ANACARDIUM OCCIDENTALE Linnæus. Cashew.

A small tree cultivated for its edible fruits, the seeds of which yield a valuable oil, (33, p. 125) or are eaten roasted. (40, p. 215) De Candolle reaches the opinion that this tree is of American origin and quotes Ernst that it is indigenous in the Amazon basin, (5, p. 199) although Sturtevant thinks that it is indigenous in the West Indies, Central America, and South America. (10, p. 47) It grows wild generally in dryer parts of Mexico and Central America. The Portuguese introduced it into India and the Malay Peninsula. (5, p. 199)

In the Philippines it is of wide dissemination, but not extensively cultivated.(40, p. 215) It has these native names: *casoy* (T. and V.); *casuy* (T.); *bollogo* (Il.); and *balubad* (T.).

The fruit and receptacle are the most important products of the tree. The enlarged basal part, receptacle, is red or yellow, pear-shaped, and very fleshy and spongy. It is astringent when green, but when ripe has a pleasantly acid flavor. The pericarp of the fruit contains an oil, cardol, which is acrid and caustic. The roasted kernels are edible, having a pleasant milky flavor.

The gum resin contains 90 per cent of anacardic acid, and 10 per cent cardol. In the Philippines, wood soaked in it is preserved from the ravages of white ants, for which purpose it is also used by bookbinders.(19, p. 85)

The nomenclature for this plant in the Philippines shows considerable local development. The most constant term of widest diffusion is *kasúi;* enough like the English word *cashew* to allow us more than a suspicion that both are derived from an unknown American word.

The Tagalogs use the term *kasúi* which carried unmodified also to the Ilocanos in northern Luzon. It carried to the Ibanags of Cagayan Valley as *kasói,* and among the Igorots as *kosing.* To the southernmost Sulu the term went as *kasul.*(15, 2: 469)

There is also much variation in terminology in the different dialects. *Kasui* varies to *kachuí* among the Tagalogs, among whom a whole cluster of terms arose: *balúban, balúbat, balúbar, balumbang, balúbad.*(15, 2: 469) From Ilocano a wide variation is also reported: *kológo, balógo, balúgo,* and the odd term, *sambalduke.*(15, 2: 469)

Thus we see the terminology of this relatively unimportant plant widely diffusing on the form *kasui;* but also showing a strong tendency to dialectic patterning on local words.

FRAGRANT FLOWERING PLANTS

CESTRUM NOCTURUM Linnæus. Dama de noche (lady of the night).

A shrub with small tubular flowers which fill the air at night with a delightful fragrance. It was early introduced into the Philippines, for we find mention of it by Mercado writing in 1650.(3, 4: 3, 59) It is known everywhere among the Filipinos by its Spanish name, *dama de noche,* which indicates a high value or extraordinary esteem on their part and merits the ethnologist's attention.

The Filipinos from time immemorial have loved fragrant smells and in Philippine culture perfumes have entered deeply. The Spaniards found them using perfumes which they got from the *ilang-ilang* (*Canangium odoratum*) and civet cats, as well as perfumes they got in trade with Chinese.

In many dialects to kiss and to smell is the same word, for the old, and still to a greater or less degree prevalent, custom was to kiss by smelling. Jagor noted lovers smelling if not their beloved, then some article belonging to the sweetheart, commonly a handkerchief. (11, p. 132) Another foreigner, even more conversant with the Philippines, Foreman, says that they do not kiss, but smell each other, placing the nose and lip on the cheek and drawing a long breath. (9, p. 181)

In Nueva Vizcaya the author learned an interesting origin myth of that region, about the pine tree. The pine tree was an ugly girl who prayed the gods to be changed into a form that everyone would love. She was changed into a pine tree, which all men kiss. This story was quite unintelligible until it was explained that before the tree is cut down the woodsman gashes the tree, and smells it to ascertain if it contains enough pitch for good firewood. Thus, since kissing and smelling were synonymous in their ideology, the girl had had her petition granted.

Jagor's footnote [1] reports the identical custom from India.

This plant is planted around the houses in every town and barrio in the Philippines. Indeed, one of the charms of night in the Islands is the cool night breeze, strongly scented with its delicate fragrance.

In other countries it is known by similarly descriptive names, according to Standley. (2, p. 1282)

Huella de noche (smells at night) in Puebla, Coahuilla, and southern Mexico; *galan de tarde* (gallant of evening) in Oaxaca; *galan de noche* (gallant of the night) in Guatemala and Cuba; *reina de noche* (queen of the night) in Guatemala.

Though it is poisonous, an extract of the plant is employed as an antispasmodic, especially in epilepsy in Mexico.

This use of the plant did not penetrate into Philippine culture.

[1] "Lewin (Chittangong Hill tracts 1869, S.46) erzählt von den dortigen Bergvölkern: 'Ihre Art zu küssen ist sonderbar: statt Lippe an Lippe zu pressen, legen sie Mund und Nase auf die Wange, und ziehn den Atem stark ein. In ihrer Sprache heisst es nicht: Gieb mir einen Kuss, sondern; rieche mich.'" Reisen in den Philippinen (1873) 132.

PLUMIERA ACUMINATA Ait. Temple flower.

The temple flower is an American plant very common in Mexico from where it was introduced into the Philippines. It is a tree with very fragrant white or yellowish flowers, and is extensively planted in the Philippines. When in bloom the tree is covered with the blossoms, which children and girls thread on strings to wear, much as the Hawaiian *leis*, which is often made of the same flower. In the Philippines this use is by no means as important as the Hawaiian use of the leis.

The trees are commonly planted in the plazas of Philippine towns, but they are esteemed less than the brilliant red-flowered flame tree (*Delonix regia*) which, though a native of Madagascar, is called *caballero* or *arbol de fuego*, indicating Spanish introduction into the Islands.

The temple flower carried its Aztec name *kalachúche* into all dialects of the Philippines where the Spanish influence was strong. The Tagalogs use *kalachúche, kalasúsi, kalatsútsi, kalasási, karachúcha,* and *karatúche.* (15, 3: 321) The first of these names carries to the Bicols of southern Luzon.

The Ilocanos of the north say *kalanúche* or *kalonóche.* Among the Visayans of Panay the term gets varied to *kachúchi.*

SUMMARY

The diffusion of American plants in the ethnobotany of the Philippines was aided by one of the strongest forms of organized diffusion, missionary zeal. The great mission establishments that Spain had planted over most of America had their counterpart in the Philippines, where they dominated everything. These missions were great educational establishments that not only Christianized the natives and taught them "right manners and good conduct," but also educated them in the use of domestic animals, improved agricultural technics, better household arts, etc. New plants were introduced, and their cultivation was taught to the natives. (2, vol. 1, Introduction)

Despite this organized aid, some of the American plants—camotes and tobacco—extended to many parts of the Archipelago before the missions were established, while others, especially American fruits, lagged despite the best efforts of the missionaries.

Tobacco had the greatest effect on primitive cultures of the Philippines. It first promptly attached itself to the buyo complex, and then like the ungrateful camel in the Arab's tent, largely

displaced betel nut in the ceremonial, social, and everyday life of the people. Smoking tobacco, rather than chewing, is the commonest form of narcotic pleasure in the Islands. Tobacco carried its foreign name even to groups isolated from Spanish contact.

No American plant furnished alcoholic beverages. The pulque complex was not introduced with the agave, since the native people of the Islands had a plentiful supply of liquor from the coco palm (*tuba*, an excellent drink) in Mindanao and Visayas, and *basi* from sugar cane in the north, as well as rice wine everywhere. All Spanish accounts, even that of sympathetic de Morga, agree that the natives drank a great deal, and to excess at all ceremonials, as most primitive people still do. The friars stamped out this practice almost completely, and nowadays the sight of an intoxicated Filipino is rare indeed.

Turning from vices, which in cultural contacts seem to spread faster than other traits, we see that, though the camote spread with amazing swiftness, it failed to integrate as well as tobacco into the culture, and is still thought of as a food fit only for the poor. Corn has the same status in the psychology of the Filipinos and its spread was slower, as it had to compete with an elaborate rice complex. Corn serves only as a catch-crop, though it is a staple where rice does not grow to advantage. In Cebu and in Cagayan Valley it replaced rice for a population in excess of a million. In the utilization of corn, it was taken completely out of its characteristic Mexican complex and fitted into the prevailing rice patterns. Squashes and tomatoes have long been important vegetables in the Philippines because they supplied deficiencies in the local diet. Beans and chiles, like corn, escaped completely from their Mexican contexts, beans being used mostly as a vegetable, string beans.

The prominence of Mexican plants in the American element of the ethnobotany of the Philippines is noteworthy. This resulted from the continuous contacts of the Islands and Mexico in the long trade monopoly between Acapulco and Manila from about 1600 to 1820. The South American plants, potatoes, peanuts, and cassava, were common in Mexico before the Spaniards came. Some other South American plants of the Amazon Valley found a diffusion across the Atlantic into Europe and thence into Asia, but these diffusions were on the whole more recent. We have seen how one of these plants, the pineapple, thus travelled from west to east and entered the Philippines from China. For this plant the Filipinos found an extraor-

dinary use, in extracting the fiber for use in weaving their most highly esteemed fabric, piña cloth. Like silk in China and Japan, piña cloth in the Philippines furnishes the material for clothes of prestige, social ritual, and ceremony.

The American fruits were, in general, slow to spread, except the guava, which soon came to grow wild everywhere from the seeds dropped by birds. The papaya was so useful that its culture became common. Most of the American fruits, however, are even now commoner around Manila, the center of diffusion, than elsewhere. The reason for this slow diffusion is obvious; the Filipinos are already bountifully supplied with a considerable variety of excellent fruits of pre-hispanic introduction.

The American medicinal plants represent a cultural migration in which the lore and technic as well as the plants were introduced. The early Spanish missionaries were keenly interested in medicinal plants and in folk medicine, and having none other, often used them on themselves. The first work on Philippine botany is Fr. Mercado's notes on medicinal plants written in 1650. Another friar, some centuries ago, naïvely informs us of the *Indios,* "But it is in their superstition that they most show their savagery. They think that disease is caused by the flight of the spirit, whereas all intelligent men know that sickness is caused by fluctuations of the humors." To-day his ideas are as strange as those he criticized.

Among the American plants were some which became important money crops in trade with China and Mexico, and which were finally given great impetus with the opening of the Suez Canal in the nineteenth century. The first of these plants was tobacco and then cacao. Both immediately became popular, and considerable interisland trade grew up. The cacao business flourished for two centuries and then died out because of fungous disease and lack of care of the delicate plants. There are a few cacao plants in Lipa, Batangas, once a great center of this industry, but now these are a curiosity. In spite of the poor farming methods, the tobacco business is still important. A century after the introduction of cacao, indigo was introduced from America and an important business in this dye grew up with China. This lasted until the artificial dyes became cheaper. The other great American profit crop, greater in potentialities than actualities, however, is rubber, the spread and development of which is one of the most fascinating chapters of modern industry.

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APLOCHEILUS LUZONENSIS, A NEW PHILIPPINE CYPRINODONT[1]

By Albert W. Herre

Of Stanford University, California

and

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Of the Fish and Game Administration, Manila

ONE PLATE

APLOCHEILUS LUZONENSIS Herre and Ablan sp. nov. Plate 1.

Dorsal 5 to 7; anal 15 to 18; 30 to 35 scales in a longitudinal, 10 in a transverse series; 19 to 21 predorsal scales to the large scale on the occiput.

Body laterally compressed, head flattened above; depth 4 to 4.3 times, head 3.4 to 4.25, and caudal about 4 in length; the circular eye 2.7 in head, much longer than snout, and a little less than the width of the interorbital space; origin of the dorsal above the 12th anal ray; longest dorsal and anal rays equal, 4.7 to 5 in length; least depth of caudal peduncle twice in head; anal origin approximately midway between pupil and caudal base; ventral origin halfway between tip of snout and posterior angle of anal base; pectoral a little shorter than head; the truncate caudal has square corners.

Color in life gray, with a yellow sheen above and a silvery luster along the sides; a dusky stripe extends from upper angle of opercle to caudal base, most evident posteriorly; some specimens have black spots scattered over the sides posteriorly, and on the caudal base; dorsal, anal, ventrals, and upper and lower portions of caudal are usually yellow or yellowish, but may be colorless; sometimes there are one or two cross rows of black spots in the central part of the basal half of caudal; pectorals colorless.

Color in alcohol varies from pale gray to blackish, often with black specks on the caudal peduncle; a very narrow blackish lateral line is usually present; a blackish line runs along the

[1] Contribution No. 5 from the Fish and Game Administration, Manila.

middle of the back from head to dorsal fin; sometimes there is a blackish line above the anal base; the fins are usually colorless, but all of them may be black or blackish; the caudal often has one or two rows of black spots basally.

Type: No. 41062, Fish and Game Administration collection, 30 mm in length, and 29 cotypes from 24 to 30 mm in length, collected by the junior author from a creek and from rice fields at Solsona, Ilocos Norte, Luzon, October, 1933.

Over 500 living specimens collected at the same time were placed in the Manila Aquarium, Fish and Game Administration, and are under observation at the time of writing, December 20, 1933. More than 500 alcoholic specimens, 9 to 30 mm in length, from the same locality, are also in the collection. A few cotypes and other specimens are also in the collection of Stanford University, California.

The present new species is very close to *Aplocheilus celebensis* from which it differs in having a slenderer body, fewer predorsal scales, and a smaller transverse scale count. It is very distinct from all other species of the genus in having a truncate caudal fin.

We append a comparison of the number of fin rays and scales in the species of *Aplocheilus* occurring from India to Japan.

Species.	Country.	Fin rays.		Scales in lateral line.
		Dorsal.	Anal.	
A. luzonensis	Luzon	5–7	15–18	30–35
A. celebensis	Celebes	7–9	17–21	30–32
A. javanicus	Java	7	21–23	29–30
A. latipes	Japan	6	19–20	29
A. melanostigma	India	6–7	20–24	27
A. timorensis	Timor	9	17–19	31–34

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ILLUSTRATION

PLATE 1. *Aplocheilus luzonensis* sp. nov.; from the type. (Drawing by Antonio Verzosa.)

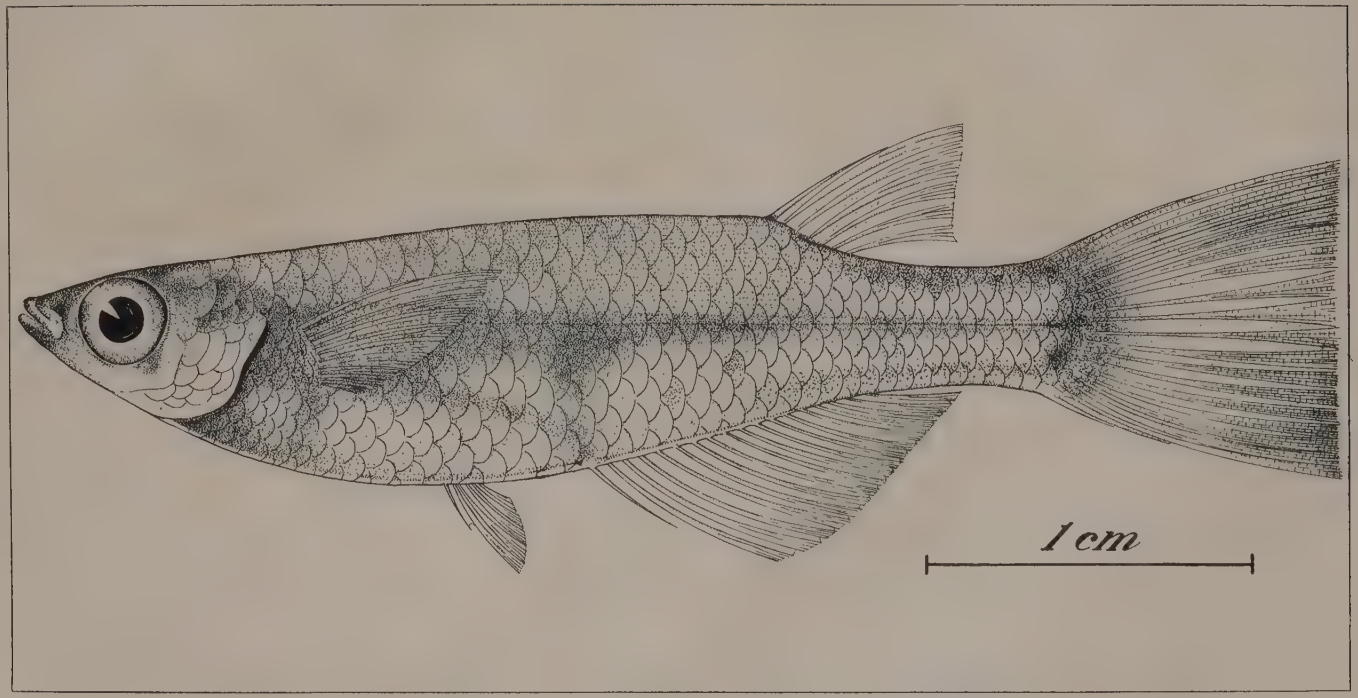

PLATE 1. APLOCHEILUS LUZONENSIS SP. NOV.; FROM THE TYPE.

NEW AND LITTLE-KNOWN PHILIPPINE COLEOPTERA

By K. M. Heller

Zoölogical Museum, Dresden, Germany

ONE PLATE AND FOUR TEXT FIGURES

In this paper I have given descriptions of some new species, and supplementary and correcting notes on earlier species some of which were based on single specimens. The studies of which this paper is the result were facilitated by material collected by the late C. F. Baker, the late G. Boettcher, the late O. Schütze, Mr. F. C. Hadden, of the Hawaiian Sugar Planters' Association and at one time resident at the College of Agriculture, Los Baños, Luzon, and Mr. W. Jark, of Hamburg. Owing to Mr. J. D. Alfken, custodian of the Bremen Museum, and to Mr. H. Gebien, of Hamburg, typical specimens of all species herein described are represented in the Dresden Museum. The museum, moreover, has other important material, obtained through the kindness of the late J. Moser and, by acquisition, through Staudinger and Bang-Haas.

In the following list only new species have been supplied with numbers; upon the remaining items only supplementary and synonymic remarks are given.

DYTISCIDÆ

1. *Sandracottus angulifer* sp. nov.

CERAMBYCIDÆ

LAMIINÆ

Cereopsius mindanaoensis (W. Schultze).

2. *Cereopsius marmoratus* sp. nov.
3. *Agelasta basimaculata* sp. nov.
4. *Enispia samarana* sp. nov.

Atelais (Sybra?) roseolata Heller.

Atelais (Sybra?) bifasciata Heller.

5. *Epaphra minor* sp. nov.
6. *Glenea vestalis* sp. nov.
7. *Glenea pistrix* sp. nov.

Glenea dido Aurivillius and other species.

CURCULIONIDÆ

SITONINI

8. *Catachaenus sulcifrons* sp. nov.

PACHYRRHYNCHINI

9. *Pachyrrhynchus stellulifer abranus* subsp. nov.
10. *Pachyrrhynchus orbifer murinus* subsp. nov.

Exnothapocyrtus lixoides Heller.

11. *Metapocyrtus currani* sp. nov.

CELEUTHETINI

12. *Pseudottistira subtuberculata* g. et sp. nov.
13. *Eupyrgops maquilingi* sp. nov.
14. *Neopyrgops prasina* sp. nov.

HYLOBIINI

15. *Styanax inconspicuus* sp. nov.
16. *Orthorrhinus rugosus philippinus* subsp. nov.
17. *Orthorrhinus brevirostris* sp. nov.

ALCIDINI

18. *Alcides alfkeni* sp. nov.
19. *Alcides haddeni* sp. nov.
20. *Alcides mimus* sp. nov.
Alcides dipterocarpi G. A. K. Marshall.

MENEMACHINI

21. *Acicnemis haddeni* sp. nov.

CAMPTORRHININI

22. *Pachyonix inversa* sp. nov.

CRYPTORRHYNCHINÆ

TYLODINI

23. *Tragopus* (?) *sexpunctatus* sp. nov.

CRYPTORRHYNCHINI

24. *Sclerolips reducta* sp. nov.

ZYGOPINI

25. *Nauphaeus alboplagiatus* sp. nov.

CALENDRINÆ

26. *Anathymus lineatocollis* sp. nov.

SPHENOPHORINI

27. *Cosmopolitus pruinosus* sp. nov.
Cosmopolitus sordidus Germar.
28. *Sphenophorus octomaculatus* sp. nov.
29. *Eugithopus bilineatus* sp. nov.
Eugithopus interruptolineatus (Heller).
Eugithopus flavoplagiatus (Heller).

CRYPTODERMINÆ

30. *Cryptoderma fractisignum* sp. nov.

SCARABÆIDÆ

CETONIINI

Podopogonus boettcheri Moser.

LUCANINI

Gnaphaloryx opacus Burm.
Metallactulus parvulus Hope.

FIGULINI

Nigidius montanus Heller.

DYTISCIDÆ

1. SANDRACOTTUS ANGULIFER sp. nov. Male. Plate 1, fig. 1.

Ellipticus, niger, elytris maculis obscure aurantiacis (vel luridis) macula subsuturali, postmedia, subsuturali angulata ornatis; capite lurido, fronte inter oculos ante fascia obtusangulata, post altera, sed medio interrupta, a präecedente aeque distante, nigris; prothorace nigro, lateribus late lurido-marginato, medio, juxta marginem, macula minuta lurida; elytris seriis tribus (exterioribus vix observandis) perremote punctatis, margine laterali, triente apicali excepto, ut ramo brevi, post humerum oblique reflexo, fascia media, brevi undosa oblique promota, aurantiacis, praeterea, eadem colore; utrinque maculis tribus, in margine basali, harum media minima, intima, maiore, circulari, extrema vittiforme, altera lineola, subapicali, marginali, obliqua, altera punctiforme, suturali, apicali. Long. 14.5, lat. 8.5 mm.

MINDANAO, Davao (ex coll. C. F. Baker 7251).

An easily discernible, black, exactly elliptic species; head, margin of the prothorax, elytra with the exception of the apical third, and diverse spots on the elytra dull orange-yellow. These spots are best shown in the figure on Plate 1, which has the characteristic obtuse, angulate, subsutural marks medially.

It differs from *S. bakeri* Régimb. and its variety *ornatus* Sharp especially by the black prothorax, bordered with yellowish laterally.[1]

CERAMBYCIDÆ

CEREOPSIUS MINDANAOENSIS (W. Schultze).

Pharsalia mindanaoensis W. Schultze[2] must be transferred to the genus *Cereopsius*. It is closely related to *C. varius* m., from Celebes,[3] and to the following new species from Mindanao.

2. CEREOPSIUS MARMORATUS sp. nov. Male. Text fig. 1.

C. mindanaoensis W. Schultze affinis, sed niger, subtilissime griseo-, in elytris albo-nigroque marmorato-pubescens; prothorace longitudine latitudini fere aequali, spinis lateralibus minus acuminatis; antennis concoloribus nigris, opacis, scapo remote punctulato; elytris latitudine humerali plus duplo longioribus, eodem modo irregulariter remoteque, post sensim subtilius punctatis; corpore subter subtilissime, mesepisternis densissime albido-pubescentibus. Long. 22, lat. 7 mm.

MINDANAO, Davao (ex coll. C. F. Baker).

Very close to *C. mindanaoensis* W. Schultze, but the body and antennæ entirely black, and the pubescence, instead of ochraceous, whitish throughout. Pro-

FIG. 1. *Cereopsius marmoratus* sp. nov., male.

[1] Ann. Soc. Ent. France 68 (1894) 338.
[2] Philip. Journ. Sci. 16 (1920) 197, pl. 1, fig. 7.
[3] Abh. Ber. Mus. Dresden No. 3 (1898) 35, pl. ——, fig. 10.

thorax distinctly longer, its subapical and subbasal furrow less impressed, the lateral tooth less acute. Underside delicately, the mesepisterna densely, whitish pubescent. The related *C. varius* m. has a much broader prothorax than either species mentioned, and a double carina in front of it.

Another allied species, which I know only by description, is *Cereopsius guttulatus* Auriv.[4] from Kina Balu, Borneo, but it differs from all similar species in that the prothorax has two transverse carinæ medially, each carina bearing three tubercles.

3. AGELASTA BASIMACULATA sp. nov. Plate 1, fig. 6.

Niger, cretaceo-tomentosa, corpore lateribus, fronte, elytris fasciis duabus, latis, per suturam interruptis parteque apicali parum lutescentibus, omnino punctatione nigro-glabra, dispersa, partim vermiculoso-confluente, humeris tuberoso-productis ut macula parva, transversa, utrinque ad scutellum, altera longitudinali, post acuminata, intra humeros, nigro-glabris; antennis subter nigro-fimbriatis, articulis, duobus basalibus griseis atque quinque nigris apicalibus exceptis, lutescentibus, apicem versus nigricantibus. Long. 18.5, lat. hum. 8.5 mm. LUZON, Tayabas, 14. IX. 1930 (ex coll. F. C. Hadden).

According to the synopsis [5] this species must be placed near *basispreta* m., which likewise has the shoulders produced, but which may easily be distinguished by the different color of the toment. Front faintly yellowish, dispersely and finely punctate, each point circled in black, vertex whitish. Antennæ gray with the three basal joints yellowish brown, on the apex blackish, the six apical joints entirely black, the whole antennæ fringed with black beneath. Prothorax also white tomentose and black vermiculosely punctate, a small transverse dot on either side of the disk impunctate. Scutellum rectangular, transverse, white. Elytra not quite twice as long as broad, with a shining black humeral cone, basal margin on either side of the scutellum with a small transverse spot; inward from the shoulders with a greater, oblong-triangular, black spot and an indistinct oblique-arcuate band beginning on the base of the suture and running to the middle of the metapisterna; furthermore, posteromedially a similar, but nearly straight, band, like the apical part, yellowish. Legs and tibiæ gray, dotted with black, the latter blackish towards the apex. Front legs elongate, tarsi gray.

[4] Ark. för Zool. Stockholm Nr. 5 15 (1923) 22.
[5] Ent. Mitt. Berlin (1923) 207.

4. ENISPIA SAMARANA sp. nov. Plate 1, fig. 10.

E. venosa Pasc.[6] simillima, sed aliter colorata atque signata, praesertim capite albido, antennis unicoloribus fulvis; prothorace maculis punctiformibus, subobscure aurantiacis, octo ornatis, nam altera utrinque in margine antico posticoque, altera utrimque in disco et post medium; elytris fascia subbasali, in primo quinto, undata, eodem colore aurantiaca atque in sutura post breviter producta, altera in secundo triente, fortiter undata atque una subapicali transversa, ut parte apicali plus minusve, tibiisque, apice excepto, albidis. Long. 8, lat. 3.2 mm.

Insula Samar (ex coll. C. F. Baker 22752).

Very similar to *E. venosa* Pasc.[7] The pubescence of the head, however, is whitish, and that of the antennæ is uniform reddish brown; prothorax with eight dull orange dots, one pair on either side of the disk, one each on the anterior and posterior margins, and one behind the middle, somewhat nearer to the lateral margin than to the median line. Elytra on either side of the scutellum with a transverse black spot, in the fifth basal part a waved rusty band which is shortly produced posteriorly along the suture, in the second third another rusty band, more waved, bounded by black spots; behind these a short transverse band more or less whitish pubescent as are the tibiæ, except for the black tips.

Atelais (*Sybra?*) *roseolata* Heller, from Mount Maquiling, and *bifasciata* Heller, from Mount Banahao [8] must be transferred to the genus *Epilista* and come under the synonyms of *Epilista guttulata* Auriv. and *bifasciata* Auriv.,[9] which have priority. My description of *roseolata*, moreover, failed to mention that it is represented on pl. 2, fig. 5.

5. EPAPHRA MINOR sp. nov. Male, female. Plate 1, fig. 8.

E. valga New. similis, sed minor, supra violaceo-nigra atque fortius punctata; prothorace minime longitudine latitudini aequali, vitta lateromarginali ut in *valga;* elytris maculis stramineo-tomentosis aliter dispositis atque formatis, nam: singulis, una, minuta, oblonga, basali in medio, altera, fere circulari, in primo quinto, altera minore subsuturali, ante medium atque vitta, medio interrupta, in triente apicali; corpore subter inpube, metaepisternis in dimidia parte anteriore, metasterno solum macula oblonga, obliqua in angulis externis, posticis,

[6] Trans. Ent. Soc. London II 5 (1864) 51, pl. 1, fig. 1.
[7] Loc. cit.
[8] Ent. Mitt. Berlin-Dahlem 13 (1924) 211.
[9] Ark. för Zoolog. Stockholm No. 25 15 (1923) 23.

abdomine seriis duabus, altera submediana, e maculis minoribus, altera, marginali, e maculis maioribus formatis, stramineo-tomentosis. Long. 9 ad 14 mm.

LUZON, Prov. Laguna, Pañgil, prope Paete, F. C. Hadden legit (ex coll. Dr. Reinh. Meyer, Darmstadt) in Mus. Dresden.

Smaller than *E. valga* New., puncture of the upperside coarser, the underside, except for the yellowish spots, shining smooth, prothorax and elytra black with an intense violet shimmer, the straw-colored spots different in form and arrangement; namely, each elytron has a small oblong spot in the middle near the base, in the first fifth another nearly circular spot, nearly of the size of the middle coxæ, a point anteromedially, near the suture, and a stripe in the apical third, interrupted in the half and its two parts acuminate at the ends. The straw-yellow tomentose parts of the brownish underside are also different, and in the anterior half of metaepisterna consist only of a small stripelike spot at the posterior edges of the metasternum and two rows of spots on the abdomen, one along the sides, the other consisting of smaller spots on either side of the middle line.

I have before me several identical specimens of the typical *E. valga* New.[10] collected by the late Prof. C. F. Baker and by Mr. Jark (ex Mus. Hamburg) at Baguio, Luzon, and a half dozen of *E. minor*, collected by Mr. F. C. Hadden at Pañgil, Laguna Province. As these two localities are separated by a distance of about 250 kilometers and neither form of *Epaphra* shows any inclination to individual variation, I am convinced of the specific value of *E. minor*.

FIG. 2. *Glenea vestalis* sp. nov., female.

6. GLENEA VESTALIS sp. nov. Female. Text fig. 2.

G. vestae Pasc. affinis, sed obscure fuliginosa aliterque sulfureo-signata; antennis articulis duobus basalibus nigris, reliquis ferrugineis, ab sexto pallidioribus; vertice lineis duabus sulfureis, ante convergentibus; prothorace vitta media lata, basi paulo attenuata, in dimidia parte anteriore parallela; elytris macula basali haud

[10] Figured in Lacordaire, Gen. Coleop., Atlas, pl. 106, fig. 1.

semicirculari, sed post acuminata atque per suturam cum macula rhomboidali, suturali, media conjuncta, macula subapicali transversa, margine antico convexo-rotundato, margine postico obtusangulato-concavo; inter hanc et praecedentem, utrisque aequedistante, macula punctiforme sulfurea; corpore subter sulfureotomentoso, prosterno medio, mesosterno, epimeris sufureis exceptis, toto, metaepisternis in parte anteriore abdomineque ventrito primo ultimoque, fuliginosis. Long. 13, lat. 4.5 mm.

Insula Masbate, Aroroy, G. Boettcher legit (a Dr. Staudinger et Bang-Haas acquisita).

In 1857 Fr. Pascoe[11] described *pulchella* sp. nov., from Malacca; in 1866[12] he gave a colored drawing, and changed the name *pulchella* to *vesta;* finally, in 1867,[13] he gave a more-detailed description and added the localities Singapore, Sarawak, Mysol, and Ceram. With the exception of one from the Philippines, I have no specimen before me from any of these localities, but I believe that the design alone of the latter is different enough to warrant a new name. Indeed, Pascoe says: "One of my specimens has the praeapical patch somewhat in the form of the letter X with a small spot on either side near the upper lines of the patch," but he does not say from where this specimen came. The new Philippine form also has a small supernumerary dot on either side of the elytra, between the mesal and subapical sutural spot and equidistant from both. The form of the mesal vitta on the prothorax and the basal patch connected along the suture with the mesal patch, moreover, at least speak for a distinct local race.

7. GLENEA PISTRIX sp. nov. Female.

Niger, subter densius, albido-pilosa, vertice vitta tenui nigra; antennis nigris; prothorace vittis duabus, discalibus, basin apicemque attingentibus, altera tenui utrinque inframarginali, basi abbreviata, nigris; scutello transverso, fere semicirculari, cretaceo; elytris vitta media nigricante, vix tomentosa, apice cum vitta tenui, humerali, glabra, conjuncta, margine laterali tenuiter nigro-marginato; pedibus nigris, femoribus subrufescentibus; tarsorum posticorum articulo primo duobus sequentibus unitis paulo breviore. Long. 11, lat. 3 mm.

[11] Trans. Ent. Soc. London II 4 (1857) 260.
[12] Proc. Zool. Soc. London (1866) 260, pl. 28, fig. 3.
[13] Trans. Ent. Soc. London III 3 (1867) 411.

MINDANAO, Davao (ex coll. C. F. Baker).

According to the key of Chr. Aurivillius (1926), this species must be placed near *cinerea* Thoms., although it has no black spots on the elytra.

Derm black, covered all over with a whitish toment, which is very dense on the underside, a fine medial stripe on the vertex, two broader ones on the disk of the prothorax, touching the front and basal margin, and a finer one, abbreviated behind, black, beneath the lateral margin. Elytra with a slightly tomentose blackish discal stripe, jointed before the apex with a fine barred humeral stripe, a fine marginal stripe in the basal third of the suture, and another, black, along the lateral margin. Legs black, femora more or less dark reddish. First joint of the hind tarsi less than three times longer than broad.

GLENEA DIDO Aurivillius. Male.

Chr. Aurivillius was acquainted with a female specimen only when he published [14] this species and therefore the characters were not quite complete. As usual, the male is much slenderer, and has longer hind femora, than the female; moreover, the black barred mesal stripe on the elytra is not dilated in such a manner on the apex as to be confluent with the black subhumeral stripe. After a male and a female specimen from Zamboanga, Mindanao (ex coll. C. F. Baker).

The same author has given [15] a key of the Philippine species of *Glenea* of which three supposedly Philippine species could not be placed, as they still were not interpretable; namely, *lineella*, *stellata*, and *varifascia* Thoms.

The following notices on observed additional localities of the occurrence of some species may be useful: *astarte* Thoms., Luzon, Pañgil (legit F. C. Hadden); *dido* Auriv., Mindanao, Zamboanga (legit C. F. Baker 7179); *minerva* Auriv., Dinagat and Malinao (legit C. F. Baker 5521); *cylindropomoides* Thoms.; *fissiauda* and *tritoleuca* Auriv., Mindanao, Zamboanga (Baker 7180–7184); *comixta* Auriv., Luzon, Mount Maquiling; *referens* Auriv., Luzon, Mount Limay; *Macroglenea kraatzi* Thoms., Luzon, Mount Maquiling and Pañgil (legit F. C. Hadden).

[14] Philip. Journ. Sci. 30 (1926) 101. [15] Tome cit. 92–98.

CURCULIONIDÆ

8. CATACHAENUS[16] SULCIFRONS sp. nov. Male, female.

Niger, squamulis griseis, plus minusve ellipticis, partim margaritaceo- aut aeneo-micantibus, in prothorace elongato-trigonis, sat dense tectus; rostro latitudine vix longiore, dorso ad latera haud angulatim declivi; fronte sulco medio, tenui, diametro oculari, transverso, distincte latiore, oculis modice convexis, subelongato-ovatis; antennis nigris, funiculo sex-articulato, articulo primo incrassato, latitudine vix longiore, articulo secundo multo tenuiore, primo aequali, quatuor sequentibus transversis, septimo conico, clava agnata, hac crassitudine plus sesqui longiore (9 : 25); prothorace transverso (9 : 11), lateribus paulo rotundatis, linea media pallida; scutellum punctiforme, vix squamoso; elytra deciens seriato-punctatis, punctis elongatis, praecise definitis, post, interdum atque ante medium, utrinque intra striam sextam et octavam fascia, obsoleta, pallidiore, margaritaceo-micante; sutura apice (in femina, tuberculo minutissimo). Long. 6 ad 7, lat. 2 ad 3 mm.

LUZON, Subprov. Benguet, Monte Santo Tomas, G. Boettcher legit (a Staudinger et Bang-Haas acquisitus).

Black, covered with minute, gray, apple-kernellike (not hairlike) tolerably dense scales, glittering more or less, metallic or pearly, along the middle of the front and of the prothorax and on one or two bands of the elytra. Antennæ black, scape reaching to the middle of the eye, funicle with the first joint scarcely longer but thicker than the second, fifth to seventh transverse. Prothorax broader than long (11 : 9), sides slightly rounded, base not margined. Elytra with ten rows of oblong punctures, intervals flat, without granules; in the second, sometimes also in the first third, between the sixth and eighth striæ with an indistinct, paler, glittering, metallic band. Legs black, without teeth.

[16] Deutsch. Ent. Zeitschr. Berlin (1925) 210–223. Mr. Eduard Voss gives therein the difference between *Eugnathus* Schönh. (1834) and *Catachaenus* Schönh. (1840); in consequence of this *sulcifrons* m., with a transverse thorax and without a lateral ridge, dorsally upon the rostrum, must be placed with *Catachaenus;* however, the broader front and the more (even as in the genotype, *E. viridanus* Schönh.) flattened and longer eyes are in contradiction to *Catachaenus.* I doubt, therefore, whether *Catachaenus* can stand as a valid genus.

9. PACHYRRHYNCHUS STELLULIFER ABRANUS subsp. nov. Plate 1, fig. 4.

A specie typica differt: statura minore, squamositate albida, generaliter vermiculatim discerpta atque multo expansa, in prothorace crucem formante, in elytris, distinctius seriato-punctatis, fascia basali cum fascia media, lata, ad suturam haud interrupta ut cum parteapicali, fere toto vermiculatim vermiculato-squamosa, per spatium secundum atque per vittam marginalem plus minusve conjuncta. Long. 9.5, lat. 4.5 mm.

LUZON, Prov. Abra (ex coll. O. Schütze). Quatuor specimina aequalia in Mus. Dresden et Bremen.

I hesitate to consider this form a "species," although the differences from *stellulifer* might justify doing so. Probably, however, there exist still other intermediate forms from other localities. The principal mark of *abranus* is the more-extended and vermiculose-scratched whitish scaling which on the prothorax assumes the appearance of a cruciform figure, and on the elytra appears as a large median band connected by a lateromarginal stripe and, on the second interspace, by a more or less interrupted dorsal stripe, with the basal band and the apical part of the elytra.

10. PACHYRRHYNCHUS ORBIFER MURINUS subsp. nov. Plate 1, fig. 3.

Subchalybaeo-niger, squamositate cinerea sat dense obsitus; prothorace maculis nigro-glabris ut in *P. orbifero*, sed in elytris multo reductis; nam inter striam tertiam atque sextam, in primo secundoque tertio, macula transversa, altera rhomboidali, basali, altera inverso-cordiforme, in secundo triente, utrisque, ut macula minuta apicali, suturalibus; femoribus ante et post tumorem griseo-anulatis. Long. 12, lat. 5.9 mm.

LUZON, Prov. Ilocos Sur, Cabugao (lat. septentrionali 17° 48′), specimina dua aequalia, O. Schütze legit (in Mus. Dresden et Hamburg).

W. Schultze [17] illustrated a series of *Pachyrrhynchus orbifer* varieties from Ilocos Norte. The form given by him on pl. 6, fig. 7, seems to come close to *murinus*, but the sutural spots of the latter are widely distant from each other and of different form, so that a subspecific name seems recommendable.

Exnothapocyrtys lixoides Heller.—Since I described [18] this species from a single male, I obtained from the Museum at Hamburg a female, collected by Mr. W. Jark at "Bokod" (certainly

[17] Philip. Journ. Sci. 23 (1923) 640–641.
[18] Wien. Ent. Zeit. (1929).

a mistaken spelling of "Bokos"), near Mount Polis, Ifugao Subprovince, Luzon. As was to be expected, the sexes differ considerably. The elytra of the female slope gently at the posterior end and the apex of the suture is abbreviated, forming a rectangularly truncate apical margin; the lateral margin of the slightly impressed anal sternite shows a tubercle in the middle, and, as usual, the female is larger.

The female of *Ex. basimaculatus* may be distinguished, inter alia, by a deep furrow around the free margin of the anal sternite.

In the female of *Ex. subpilosulus* m. the anal sternite is impressed in the apical half and this impression is prolonged on either side to the base in the form of a furrow, circumscribing a semicircular callosity.

11. METAPOCYRTUS CURRANI sp. nov. Plate 1, fig. 12.

Rufo-castaneus, dense, laete viridi-micate squamosus, prothorace vitta lata, triente media occupante atque in elytris usque ad apicem continuata, nitido glabra; rostro latitudine tertia parte longiore, planiusculo, subruguloso-punctato, sulco medio indistincto; antennis, clava nigra excepta, rufis; fronte concava, margine supraorbitali elevato; prothorace latitudine longitudini aequali, lateribus paulo rotundatis, vitta media, glabra, subtilissime remoteque punctata; elytris seriis punctatis per squamositatem occultis, solum pone vittam suturalem, ante dilatatam, observandis, apice parce subtiliterque albo-pilosis; corpore subter nigro, pedibus rufis, femoribus apice nigris. Long. 7, lat. 3 mm.

LUZON, Subprov. Benguet, Haight's Place, H. M. Curran et O. Schütze legerunt (in Mus. Dresden et Bremen).

This species, by its verdigris-colored scaling, suggests *repandicauda* m.,[19] but its elytra are of ordinary form and the large, shining, smooth, chestnut-brown stripe along the middle of the thorax and the suture makes it easily distinguishable from all other species.

Genus PSEUDOTTISTIRA g. nov. abnorme

Rostrum breve, sulco transverso, basali, nullo, apice abrupte declivi, scrobibus lateralibus, brevibus, feveolatis. Oculi pla-

[19] Philip. Journ. Sci. § D 7 (1912) 356.

niusculis, in fronte approximatis. Mandibulae cicatrice instructae, submentum pedunculo transverso, distincto. Antennae geniculatae, scapo prothoracis marginem anticum superante, funiculo septem articulato, clava oblonga fusiforme. Prothorax modice convexus, basi truncatus. Elytra oblong-ovata, ad basin thoracis basi haud latiora, margine basali elevato, deciens striata, in femina parte apicali fortiter declivi. Scutellum nullum. Femora inermia, clavata. Tibiae posticae corbiculis cavernosis. Tarsi articulo tertio transverso, bilobato. Unguiculi liberi. Coxæ anticae coniventes, posticae valde distantes, marginem elytrorum tangentes. Mesepimera lata haud adscendentia. Mesosternum processu intercoxali, oblongo, truncato. Metepisterna angusta. Ventrita in mare quinque, intermedia brevissima, in femina duo, intermedia perfecto connata.

This new genus belongs to the aberrant "adelongnath cyclophthalm" Curculionidæ of Lacordaire, which shows, like *Cratopus*, *Elytrodon*, and others, a scar on the mandibles, a distinct transverse peduncle on the submentum, but a short, in front abruptly and obliquely truncate, rostrum without a transverse basal furrow, a lacunous antennal furrow, the anterior coxæ connate, the posterior coxæ widely distant, touching the lateral margin of the elytra, the corbles of the hind tibiæ cavernous, the claws free, and other characters which indicate its systematic position to be near *Celeuthetes*. It has some superficial resemblance to *Ottistira* but is in other respects a very aberrant genus.

12. PSEUDOTTISTIRA SUBTUBERCULATA sp. nov. Male, female. Plate 1, fig. 5; text fig. 3.

Niger, squamulis perminutis, luteis, plus minusve rosaceomicantibus, obsita; antennis obscure rufis, scapo prothoracis marginem anticum distincte superante, funiculo (clava haud computata) scapo longiore, articulo secundo primo fere duplo longiore, sequentibus tribus oblongis, sexto septimoque subnodosis, clava nigra, crassitudine fere triplo longiore, rostro longitudine capitis aequali, dorso late vageque impresso, margine supraorbitale carinulato; oculis planiusculis, rude granosis; prothorace longitudine latitudini aequali, in dimidia basali fere parallelo, in dimidia parte apicali paulo rotundato-ampliato, rude rugoso-punctato, ante medium callositate punctiformi, glabra; elytris oblongo-ovatis, margine basali sat late elevato, fortiter punctato-striatis, sutura, spatio secundo quartoque costatis, his praesertim ad declivitatem tuberculato-interruptis, tuberculis squamulis longioribus, setiformibus obsitis; femoribus posticis

elytra vix superantibus, ut reliquis modice dense setoso-squamosis, tibiis margine interno subtiliter albo-fimbriatis. Long. 4.5 ad 5, lat. 1.8 ad 2 mm.

LUZON, Benguet, Monte Santo Tomas et Baguio, G. Boettcher legit (a Dr. Staudinger et Bang-Haas acquisita).

Blackish, covered with drab, mostly reddish, pearly glittering, partly ovate, partly setiform, scales; punctures of prothorax and elytra each beset with a fine bristle, transversely directed in the former. Antennæ dark reddish, club fusiform, and nearly as long as the four preceding joints of the funicle, the second joint of the latter distinctly longer than the first, the following

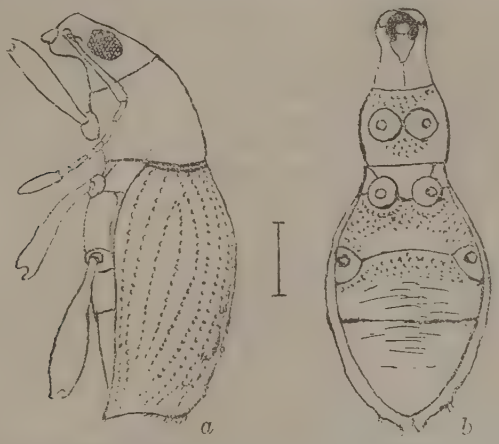

FIG. 3. *Pseudottistira subtuberculata* g. et sp. nov.; *a*, lateral aspect; *b*, ventral aspect.

gradually decreasing, but even the last still longer than broad. Prothorax with coarse punctures, disk on the front with a minute oblong callosity. Elytra ovate, punctate-striate, basal margin rather broadly elevated and smooth; suture, the second and fourth intervals elevated, and, especially on the declivity forming tubercles, beset with longer setiform scales. Hind femora unarmed, not extended beyond the elytra. Tibiæ finely whitish setose within.

13. EUPYRGOPS MAQUILINGI sp. nov. Male and female.

E. granulato Faust subsimilis sed longior atque nitido-niger, prothorace basi utrinque in medio macula parva, elytris maculis punctiformibus irregulariter dispersis ut femoribus basi apiceque, vitta supracoxali in prosterno atque in lateribus metasterni cobaltino-squamosis; antennis funiculo tenuiore, articulo tertio duobusque apicalibus crassitudine sesqui longioribus;

rostro area trapezoidali, dorsali, sulcis rectelineatis determinata; prothorace basi apiceque fortius atennuato sat dense dupliciterque punctato, spatiis inter punctis haud rogosis; elytris indistincte granulosis, spatiis transverse subrugosis. Long. 13, lat. 5 mm.

LUZON, Monte Maquiling, F. C. Hadden legit, 8. VI. 1931.

Eupyrgops granulatus Faust, without statement of an exact locality, has a dull granulate upper side, densely covered between the granules with very minute luteous squamules; *E. semperi* has nowhere a granulation and the disk of prothorax is impunctate. The new species is more elongate, with a shining upper side. Prothorax in front and at the base more attenuate, without granules, but with a double punctuation, a very fine, a coarser, and, in the middle of the base two cobalt blue squamous spots; of the same color are the dispersed punctiform spots on the elytra, a stripe above the front coxæ, the sides of meso- and metasternum, the base, and an apical spot on the legs. Two females from Mount Banahao, with dispersed punctiform bluish or whitish spots on the elytra, I do not venture to take for females of *maquilingi*.

I have also stated that *banahaonis* is the female of *semperi* Faust and extremely variable as is proved by the figure given of a female with an extraordinarily rich, extended, pale design on Plate 1, fig. 2.

14. NEOPYRGOPS PRASINA sp. nov. Female.

Nigra, omnino squamulis prasinis, metallicis, sat dense tectus; elytris erecte nigro-setulosis, macula laterali, postmedia, nigrodenudata; rostro longitudine latitudini aequali, dorso bicarinato; antennis multo gracilioribus quam in *granosa* Boh., funiculo articulo tertio, ut clava, crassitudine duplo longioribus; prothorace longtitudine paulo latiore (4 : 4.6), crebre nigro-granoso, disco vitta media, brevi, levi; elytris in spatiis seriato-granosis, granulis in parte anteriore multo maioribus adque deplanatis quam in parte declivi, in spatiis lateralibus minimis atque remotius seriatis; femoribus minus quam in *granosa* clavatis. Long. 10.5, lat. 5 mm.

LUZON, Laguna, Paete, W. Jark legit.

This species is closely related to *granosa* Boh. but of larger size and uniformly covered with moderately dense brassy green scaling; only the elytra on the sides, like *granosa*, have a bare, transverse, black patch.

The following key will facilitate ready discrimination among the known species of that genus:

1 (4) Prothorax without scaled stripes or spots, elytra behind the middle on the sides with a transverse, bare, black patch.
2 (3) Scaling of body luteous, granules of the elytra not very different in size. (Luzon.) ..... *C. granosa* Boh.[20]
3 (2) Scaling of body brassy green, granules on the anterior part of the elytra flattened and much larger than in the other half. (Luzon.) *C. prasina* sp. nov.
4 (1) Prothorax with pale scaled stripes or spots, elytra without a bare black patch on the sides behind the middle.
5 (6) Prothorax between the two scaled dorsal stripes with coarse puncture, elytra on the base and before and behind the middle with small bands and along the suture with a stripe of golden scales. (Negros.) ..... *C. banksi* Heller.[21]
6 (5) Prothorax granulate all over.
7 (8) Prothorax with flattened granules intermixed with coarse puncture, on either side of the disk with a whitish scale-stripe, elytra with irregular whitish scale-spots. (Mindoro.) *C. albovarius* Heller.[22]
8 (7) Prothorax with sharp and dense granules without intermixed puncture and scale stripes, but at the front and hind margins with a greenish scale spot. (Luzon.) ..... *C. dives* Heller.[23]

15. STYANAX INCONSPICUUS sp. nov.

Niger, parce subtiliterque lutescenti-setosus, capite corporeque subter densius lutescenti-setoso-squamosis; antennis funiculo, ab articulo tertio, articulis transversis, clava subcylindrica, crassitudine paulo longiore, apice obtusata; prothorace subtransverso, granuloso, margine basali ferrugineo-setoso; elytris latitudine duplo longioribus, apice conjunctim rotundatis, solum spatio secundo callo, oblongo, basali, granuloso; striis rude punctatis, punctis cicatricosis, ad latera praesertim maioribus, rectangularibus, inter se anguste separatis atque spatiis dorsalibus vix ad latera multo latioribus; spatiis convexiusculis, aequaliter seriato-granulosis, granulis planiusculis, setuligeris; pedibus brevibus, femoribus anticis prothorace vix longioribus, posticis ex sternito abdominali, tertio vix extantibus; tarsis coactis. Long. 12, lat. 4.5 mm.

LUZON, Prov. Laguna, San Antonio (ex coll. O. Schütze).

As the femora of this new species are armed as in *anthracinus* m.,[24] it must be placed, according to the key, near the latter, al-

[20] *Isomerinthus granosus* Boh., Schönh. Gen. Curc. 7 (1843) 249, W. Schultze, Cat. Philip. Coleop. (1915) 140; *Coptorrhynchus granosus* Boh.
[21] Philip. Journ. Sci. § D 7 (1912) 382.
[22] Op. cit. 383.
[23] Deutsche Ent. Zeitschr. Berlin (1916) 929.
[24] Cf. Ent. Mitt. Berlin-Dahlem 9 (1920) 85.

though it differs from all other species [25] by the absence of remarkable protuberances except for a granulate callosity along the base of the second interspace, of the elytra and by the apex which is neither produced nor singly rounded. The punctures of the stripes are coarse, squamigerous on the ground, and, on the sides, rectangularly oblong, separated from each other by a small bridge. Legs short, the posterior legs extended but little beyond the third ventral sternite.

16. ORTHORRHINUS RUGOSUS PHILIPPINUS subsp. nov. Male and female.

A specie typica differt: prothorace margine antico tuberis anticis perobsoletis haud nigro-penicillatis; scutello distincte transverse.

MINDANAO, Davao, mas (ex coll. C. F. Baker) in Mus. Dresden; Zamboanga, femina (ex coll. C. F. Baker) in British Mus.

In the Dresden Museum is a specimen of *O. rugosus* Montr., from Woodlark, collected by Montrouzier, which is extraordinarily similar to the form from Mindanao, but in the latter the two black dusted gibbosities are wanting and the white pubescent scutellum is distinctly transverse.

17. ORTHORRHINUS BREVIROSTRIS sp. nov. Male.

O. granosparso Fairm.[26] affinis sed rostro prothorace breviore, niger, subtiliter lutescenti, elytris in parte ante media quartaque parte apicali plus minusve albido-marmorato-squamosis, fascia post media, lata, marginem lateralem attingente, nigro-denudata; rostro crebre ruguloso-punctato, in parte basali obsolete quadricarinulato; antennis obscure sanguineis, funiculo articulo primo secundo crassiore atque longiore, sequentibus subtransverse moniliformibus, clavam versus gradatim crescentibus, clava crassitudine vix duplo longiore; prothorace longitudine sexta parte latiore, granulis glabris, oblongis dense obsito, disco carinula brevi; elytris subcylindricis, sutura spaciisque minute seriato-granulosis; tibiis posticis vix arcuatis; maris tarsis anticis haud longe fimbriatis. Long. 10, lat. 4 mm.

LUZON, Monte Maquiling, et insula SIBUYAN (ex coll. C. F. Baker).

The two males before me, one from Luzon, the other from Sibuyan, are similar to small specimens of *granosparsus* Fairm., from Viti, but unlike these, both have a short rostrum and unfringed front tarsi; on the other hand they are not quite identi-

[25] I have also described, Ent. Mitt. Berlin-Dahlem 11 (1922) 213, *Styanax overbeckianus*, from Java.

[26] Ann. Soc. Ent. France VI 1 (1881) 314 and Pet. Nouv. (1877) 287.

cal with each other. The specimen from Mount Maquiling shows on the prothorax oblong rough glabrous granules and on the disk a short carinula; elytra cylindrical, in the apical fourth and in the basal half the scaling covered with a white exudation, the former bounded behind by a blackish band, as broad as the combined lengths of the first and second ventrit, and extending to the lateral margin. The one from Sibuyan is a little larger, its scaling ocherous, the median band more black marbled, the granulation of the prothorax flattened and the short carinula on the disk wanting. I do not venture to name this form from a single specimen that perhaps represents a peculiar subspecies.

18. ALCIDES ALFKENI sp. nov. Male. Plate 1, fig. 13.

A. chalcomorpho m.[27] affinis, elytris fortius punctato-striatis, coeruleo-nigris, basin atque apicem versus virescentibus, singulis maculis, oblongis, octo, in fasciis tribus, una subbasali, altera postmediana, tertia subapicali, ordinatis; prothorace transverso, viridi-aeneo, prosterni margine basali cyaneo micante, dorso fortius quam in *chalcomorpho* punctato, in angulis anticis posticisque, ut in lobo scutellari, macula griseo tomentosa; corpore subter pedibusque obscure viridi-aeneo, femoribus apice coeruleis, dente, subdenticulato, armatis; tibiis anticis margine interno post medium angulatim dilatato. Long. 11, lat. 4.5 mm.

LUZON, Laguna, San Antonio (ex coll. O. Schütze) in Mus. Dresden et Bremen.

Allied to *A. chalcomorphus* m.;[28] elytra bluish black, towards the base and the apex changing to metallic green, with three transverse rows of gray-haired oblong-ovate, contiguous spots. First row near the base and the second behind the middle, formed by six, the third row before the apex formed by four spots, the inner spot of the first and the second spot on either side of the second transverse row removed between the first and sixth striæ to the front. Rostrum as long as the head and prothorax together, in the basal half a distinct dorsal furrow, on the sides coarser, on the back finer and somewhat rugously punctate. Antennæ black, second joint of funicle longer, the third shorter than the first, seventh conical and annexed to the club. Prothorax metallic green, formed and spotted like *chalcomorphus*, but more strongly punctate. Scutellum black, nearly quadrate, larger than in *chalcomorphus*, not inclosed by the suture in front. Elytra finely punctate-striate. Legs clavate, the hind leg extend-

[27] Philip. Journ. Sci. 19 (1921) 553.
[28] Loc. cit.

ing nearly to the apex of the elytra, its tooth denticulate on the distal edge.

19. ALCIDES HADDENI sp. nov. Male. Plate 1, fig. 14.

Praecedenti (*alfkeni*) valde affinis sed differt; rostro breviore, elytris convexioribus, striis, praesertim lateralibus, subtilioribus, spatiis levissime transverse subrugulosis, maculis auroviridibus, holosericeis, minoribus, aliter formatis ac dispositis, nam utrinque una humerali, in margine basali elytrorum introrsum continuata, una in quinta parte basali, subsuturali, rotundata, a praecedenti separata, una media, inter striam tertiam et sextam, una postmedia obliqua, inter striam tertiam et suturam, duabus marginalibus, in quinta et tertia parte anterioribus, posteriore fere rectangulare-transverso atque duabus apicalibus similiter utin *alfkeni* dispositis, praeterea parte tota apicali elytrorum auro-micante. Long. 11, lat. 5 mm.

LUZON, Monte Maquiling, 5. VI. 1931, F. C. Hadden legit (in Mus. Dresden).

This species is so nearly allied to *alfkeni* that at first I was of the opinion that, considering the longer rostrum of *alfkeni*, this form may be the female of *haddeni*, but anatomical examination proves that both specimens are males. The shorter rostrum, the fine transverse rugous interspaces, the finer striæ, and the different disposition of the spots in *haddeni*, speak for a distinct species.

20. ALCIDES MIMUS sp. nov.

A. dipterocarpo G. A. K. Marshall verisimilis, sed paulo longior, antennis articulo primo funiculari quinque sequentibus sumptis aequali, secundo, ut tertio, crassitudine longioribus; prothorace granulis maioribus, minus confertis, in dimidia basali sulco medio obsoleto, lobo scutellari acutangulo; scutello minore, haud transverso, sutura ante eum coarctata; elytris eodem modo humeris prominentibus, spatiis convexiusculis, per totam longitudinem manifeste granulatis; coxis anticis remotis; femoribus anticis intermediisque dente, lato, aciei distali denticulata, armatis, posticis dente minuto, sternitum abdominalem quartum distincte superantibus, tibiis anticis dente subapicali nullo, margine interno, in primo triente subdilatato, reliquis simplicibus; unguiculis fissis. Long. 9, lat. 5 mm.

MINDANAO, Surigao (ex coll. C. F. Baker).

In outline similar to *A. dipterocarpi* G. A. K. Marshall,[29] but a little longer. First joint of antennæ as long as the five following together, second and third longer than thick. Prothorax with acute scutellar lobe and an indistinct medial furrow in the basal half, the granulation less dense, the granules larger. Scutellum smaller, not transverse, confined in front by the suture. Shoulders of the elytra produced, interspaces moderately convex, at full length distinctly granulate. Anterior and intermediate femora with a large tooth, denticulate on the distal edge, posterior femora with small teeth and extending beyond the fourth ventral sternite. Front tibiæ enlarged in the basal half of their inner edge, without subapical teeth. Claws fissured. *Alcides morio* m., from Madras,[30] differs from *mimus*, inter alia, by the contiguous anterior coxæ and the nongranulate interspaces of the elytra.

21. ACICNEMIS HADDENI sp. nov. Female. Plate 1, fig. 15.

Ex affinitate *A. peduncularis* Pasc. (= *triangularis* Hubenth.), sed prothorace longitudine distincte latiore, similiter albido vittata, sed subter marginem lateralem vitta nigra, in elytrorum triente basali continuata atque hic latiore; scutello subtrigono, stramineo; elytris, ut prothorace reliquo, ferruginoso-fuscis, spatio quarto ad basin, septimo in tertio quarto nigro-vittatis, fascia media straminea per suturam lutescentem interrupta, ante plaga rectangulari, subtransversa, post utrinque, in spatio primo, puncto oblongo, in spatio secundo quartoque vitta nigro-velutinis detreminata; femoribus pallide lutescentibus, in dimidia parte basali atque puncto, interdum obsoleto, in parte tumida, albis; tibiis in margine interno haud subdilatatis; corpore subter squamositate fusca, sine squamulis setiformibus albis dispersis. Long. 9, lat. 3.7 mm.

LUZON, Monte Maquiling, F. C. Hadden legit 2. IX. 1931.

Similar to *A. peduncularis* Pasc., but the prothorax broader and the general color of the scaling more chocolate brown (instead of fuliginous); the postmedian whitish band of the elytra

[29] Bull. Ent. Research, London 12 (1921) 166, fig. 2; described from Dehra Dun, India, but occurs also in the Philippine Islands—Kolambugan and Butuan, Mindanao, and Cuernos Mountains, Negros (ex coll. C. F. Baker).

[30] Ent. Zeitung Stettin (1908) 171, pl. 1, fig. 4.

interrupted by the pale brownish suture; prothorax below the lateral margin, as also the elytra in the first quarter of lateral margin, on the base of fourth, and behind the middle of the seventh interspace, further, behind the white band, on the second and fourth interspace, with a velvet-black stripe and on the first interspace with a spot of the same color; before the white band, inside of the fifth punctate stripe on either side with a nearly square black patch. Legs pale hazel, in the basal half whitish, on the swollen part with an often indistinct whitish spot.

22. PACHYONYX INVERSA sp. nov. Male. Plate 1, fig. 17.

Nigra, prothorace dense, elytris, apice singulis rotundatis, maxima parte pilositate lutescentialba indutis, his intra striam tertiam plaga, basali, oblonga, in sutura continuata atque utrinque vitta, a humeris suturae mediam versus currente vittisque duabus, una laterali, ante abbreviata, altera in dimidia parte apicali, subsuturali, sed apicem haud attingente, subdenudato-nigricantibus; prothorace longitudine latiore (3 : 3.4), sulco medio, in impressione oblongo-ovata, utrinque ante subtuberculata, desinente, basi, utrinque in medio, vitta pallidiore, in elytris breviter conducta; scutello oblongo-trapezoidali; elytris latitudine plus duplo longioribus, striis spatiis, convexiusculis, latitudine aequalibus, callo subapicali nullo; corpore subter pollinoso. Long. 6, lat. 2.4 mm.

MINDANAO, Kolambugan (ex coll. C. F. Baker).

Black, densely luteously pilose, rostrum nearly cylindrical, about one-third shorter than the prothorax, at the base higher than broad and wider than in front, moderately densely punctate, sides in the basal half punctate-striate. Antennæ dark red, inserted before the middle of the rostrum, club spindle-shaped, longer than the funicle. Prothorax at the base a little broader than long, disk with an oblong-ovate impression. Scutellum oblong-trapezoidal. Elytra more than twice as long as broad, without a subapical callosity, singly rounded on the apex, only the first interspace distinctly convex; at the base, between the third striæ, a dark gray spot, prolonged along the suture; farther on either side a stripe running from the shoulders towards the middle of the suture; on the sides, another stripe, abbreviated at the base and a third stripe in the posterior half, near the suture, but not extending to the apical margin, of the same gray color. Underside densely yellowish pollinose. This is the first known Philippine species of this widely spread genus.

23. TRAGOPUS (?) SEXPUNCTATUS sp. nov. Plate 1, fig. 11.

Niger, sat dense ochraceo-squamosus; rostro prothorace breviore, subdepresso, paulo arcuato, scrobibus lateralibus; antennis in secundo triente rostri insertis, scapo oculum attingente, funiculo septem-articulato; prothorace longitudine latiore, maxima latitudine ante medium, basi recte truncato, fortiter denseque punctato; elytris latitudine quarta parte longiore, basi utrinque subsinuatis quam thoracis basi paulo latioribus eius angulis posticis amplectentibus, inter striam tertiam fascia pallidiore lutescenti, spatio, secundo maculis minutis, tribus, nigris, nam una prope ante, altera post fasciam, tertia ad declivitatem; spatiis convexiusculis atque remote, exterioribus dense fortiusque seriato-granulatis; femoribus subter haud sulcatis, posticis elytrorum apicem vix attingentibus; tarsis supra albido-pilosis. Long. 6.5, lat. 3.5 mm.

MINDANAO, Surigao (ex coll. C. F. Baker).

Derm black, hidden by moderately dense, dull yellow ocher scaling; prothorax on the posterior angles with a triangular spot, elytra between the third striæ just before the middle with slightly curved band of pale ocher, three oblong dots on the third interval, one close before, another behind the pale band, the third, on the beginning of the declivity, black. Rostrum dorsally with three carinæ, abbreviated in front. Front granulate punctate, with a carinula above the eye. Antennæ with the funicle seven-jointed. Prothorax transverse, broadest before the middle, lightly vaulted, densely and, especially along the base, very coarsely punctate, interstices of the puncture minutely granulate. Elytra ovate, narrowed in the apical fourth, one and one-fourth as long as broad, broadest before the middle, on either side of the base gently sinuate and embracing the hind edges of the prothorax; striæ fine, remotely and coarsely punctate; intervals slightly convex and remotely, the externals sharper and more densely, granulate. Legs stout, femora unarmed, without a furrow beneath, hind pair hardly reaching to the apex of the elytra. Tarsi whitish pilose above.

I have described this species preliminarily as a *Tragopus*, giving an illustration of it which will exclude all doubt as to the validity of that species, though it is certainly as little a *Tragopus* as some other species described.

24. SCLEROLIPS REDUCTA sp. nov.

S. ochrodisco m. valde affinis, sed minor, prothorace plus transverso, margine antico haud pro-producto, in dimidia parte basali,

in loco macula, vitta media, interdum fere evanescente, lutescenti; elytris spatiis in triente basali haud seriato-granulatis. Long. 5 ad 6 mm.

MINDANAO, Iligan et Kolambugan.

J. Faust established the genus *Sclerolips* [31] upon a species from Perak. Later I published a new species [32] from Cape Engaño, northern Luzon. W. Schultze [33] mentions Calayan, one of the Babuyan Islands, as the locality of its occurrence. I must call attention to this error because the single specimens from both localities mentioned are not quite identical, and under such circumstances it is doubtful that they represent local races. This matter can only be cleared up by means of copious material. The following key will illustrate this best.

1 (2) Prothorax on the disk before the middle with a tubercle beset with black bristles, elytra on the second quarter of the suture with a black brush. (Perak.) ..... *S. sticticus* Faust.

2 (1) Prothorax without a black setose tubercle before the middle and the elytra without a black brush on the second quarter of the suture.

3 (4) Scutellum circular, elytra grayish setose, the alternate intervals and the suture with more erect, remotely seriate, short and thick setæ, prothorax with a transverse row of four black setose tubercles. (Formosa.) ..... *S. horrida* Heller.

4 (5) Scutellum rectangular or oblong, prothorax without a transverse row of tubercles, elytra on the alternate intervals without short, thick, and more-erect setæ.

5 (6) Prothorax in the basal half along the middle with an ovate yellowish spot, elytra on the suture and intervals of the basal half with remotely seriate, minute shining granules. (Cape Engaño, Luzon.) ..... *S. ochrodiscus* Heller (typicus).

6 (7) Prothorax in the basal half with a square, in front slightly rounded, yellowish spot; scutellum square, elytra without seriate shining granules on the intervals. (Calayan Island, Babuyanes.)
S. ochrodiscus Heller var.?

7 (8) Prothorax more transverse, front margin less produced than in *ochrodiscus*, with two black setose spots, in the basal half with a yellowish line along the middle, elytra without seriate granulate intervals. (Iligan, Mindanao.) ..... *S. reducta* sp. nov.

8 (9) Prothorax in the basal half, along the middle, with a yellowish stripe only twice as long as broad; without a black setose spot on the front margin. (Cuernos Mountains, Negros.)
S. reducta Heller var.?

9 (8) Prothorax without a pale middle line in the basal half, upper edge of mesepimera without pale scaling. (Samar.)
S. reducta var.?

[31] Ent. Zeit. Stettin (1895) 22.
[32] Philip. Journ. Sci. § D 7 (1913) 142.
[33] Cat. Philip. Coleop. (1915) 147.

25. NAUPHAEUS ALBOPLAGIATUS sp. nov. Male. Plate 1, fig. 16.

N. decorato m. affinis, sed aliter signatus; rostro latitudine fere triplo longiore (1 : 2.9), creberrime subtiliterque, longitudinaliter rugoso; antennis rufis, funiculo articulo tertio subtransverso, clava quadriarticulata; prothorace sulco medio tenui, vitta submarginali, lata, elytris fascia basali, intra striam sextam ac per vittam, in spatio primo, cum fascia antemedia conjuncta quartaque parte, apicali, ut corpore subter, cretaceo-squamosis, sutura ad basin callo elongato, granulis maioribus circiter quinque obsito. Long. 10.5, lat. 4.5 mm.

SAMAR (ex coll. C. F. Baker).

I have before me only one female of *decoratus* m.[34] and one male of the new species, and therefore it is possible that a few of the observed particularities of the latter are sexual differences. Superficially speaking, one may say that all the loop-like figures of *decoratus* appear filled up in *alboplagiatus* with white scaling. For the specific value of it speaks the convex and granulate base of the suture, the granules of which are larger than the rest of the elytra; the second interspace moreover is broader at the base than the third, while the contrary is true in *decoratus*. The suture in the latter species, at least before the declivity, is as broad as the second interspace, in *alboplagiatus* it is much narrower and the tenth stripe is continued to the apex, whereas in *decoratus* the tenth stripe extends only to the apex of metaepisterna.

26. ANATHYMUS LINEATOCOLLIS sp. nov. Male.

A. colorato Faust, ex Java, affinis, niger, pedibus, genubus nigris exceptis, segmentoque anali rufis; rostro nitido, sat remote punctato; antennis funiculo primo incrassato, longitudine latitudini aequali, secundo latitudine paulo longiore; prothorace latitudine sesque longiore, remotius guam in *colorato* punctato, lineis tribus ut macula in vertice atque scutello, vittiforme, luteopruinosis; elytris, inter striam sextam, plaga ovata, ultra secundum trientem extensa et per suturam divisa, rufa; pygidio luteopruinoso, utrinque pone carinam dorsalem vitta nigra, ad basim alteracum conjuncta. Long. 9, lat. 2 mm.

LUZON, Monte Maquiling, F. C. Hadden legit 17. IV. 1931.

Allied to *lineatocollis* Faust[35] but easily distinguished by the much longer prothorax with three pale luteous stripes and the luteous pygidium with a black stripe on either side of the middle

[34] Philip. Journ. Sci. 25 (1924) 299.
[35] Ent Zeit. Stettin 51 (1898) 208.

keel confluent to the base. Dorsal patch of the elytra ovate, laterally determined by the sixth stria, halved by the black suture. As this red patch is very variable in extent in *coloratus* Faust, it may also be so in *lineatocollis* of which I have only a single specimen before me.

27. COSMOPOLITES PRUINOSUS sp. nov. (=PRUINOSUS Faust in lit.)

C. (*Sphenophorus* olim) *sordido* Germ.[36] similliniger, luteo pruinosus, sed prothorace paulo longiore, ante minus abrupte coarctato; elytris brevioribus, subcordatis, sutura spatiisque planiusculis, uniseriatim punctatis striis punctatis multo latioribus. Long. 11, lat. 4 mm.

LUZON, Manila, legit Dr. O. F. v. Möllendorff; "Philippinen" legit W. Jark 1919; Nord Borneo, legit John Waterstradt.

Like *sordidus* Germ. black, incrusted with a waxlike exudation; prothorax a little longer, on the sides less rounded, less abruptly attenuate in front; elytra shorter, more cordiform, intervals flat, broader than the slightly impressed rows of somewhat remote and coarser punctures.

This species may possibly be confused in collections with *C. sordidus* Germ., a common and wide-spread species which also occurs in the Philippine Islands. In the Dresden Museum the following localities are represented by specimens: India or. (ex coll. Dohrn-Faust); Cambodia, Kampong Toul (Vitalis de Salvaza); Ceylon (Dr. W. Horn); Andaman Islands (Merkel); Malacca (Dr. Staudinger); Sumatra, Deli (Devrient); Java (H. Fruhstorfer); North Borneo (C. Wahnes, coll. W. Müller); Celebes, Makassar (C. Ribbe); Lombok, Sapit, 2000 (H. Fruhstorfer); Philippines, Mindanao (C. F. Baker); Aru (C. Ribbe); Neu Caledonia (Dr. F. Sarasin and Alex. Bau); Madagascar (Dohrn, Chevr. det.); Reumion (Chevr.); Fernando Po (ex coll. Dr. F. Zacher); Madeira (W. Schnuse); and because *striatus* Fahrs. falls under the synonym of *sordidus* Germ. also Brasilia (in coll. Faust).

28. SPHENOPHORUS OCTOMACULATUS sp. nov. Female.

Niger, corpore subter omnino cinereo-pruinoso, prothorace elytrisque subsanguineis, pustulis setuligeris, punctiformibus, dense adspersis, illo utrinque in disco, his ad humeros macula minore atque inter striam secundam et sextam macula maiore, anteme-

[36] On this occasion I should like to express my best thanks to Dr. J. Brüel, of the University Halle a/S, for enabling me to examine Germar's type specimen.

diana, ut subapicali, obliqua, elliptica, inter striam tertiam et nonam, nigro-velutinis. Long. 10, lat. 3.5 mm.

Insulae Philippinae, ex coll. O. Schütze.

Allied to *S. alfurus* m.[37] but larger and the gray toment of the dark blood-red upperside dispersed in moderately dense round dots with a very minute center bearing a short, often loose, bristle. Prothorax with an indistinct black stripe along the middle and a well-marked roundish black spot on each side of the disk. Elytra with similarly disposed but deep velvet black spots; namely, a small one on the shoulder, a larger one before the middle between the second and sixth stripe, and an oblong one before the apex between the fourth and tenth stripes.

29. EUGITHOPUS BILINEATUS sp. nov. Male. Plate 1, fig. 9.

Niger, prothorace elytrique similiter ut in *interruptolineato* m., lineis, sed albo-incrustatis ornatis, nam in prothorace utrinque una marginali, altera submarginali, una in elytris usque ad medium spatii secundi extensa, juxta apicem eius praeterea puncto in spatio primo, altera in spatii tertii triente apicali, cum altera marginali, ante abbreviata, in spatio sexto conjuncta; scutello nigro, vittiforme; corpore subter pedibusque cinereis, prothorace vitta inframarginali, mesepimeris, metepisternis, metepimeris atque vitta marginali in abdomine albo-incrustatis; pygidio rude punctato, carina media. Long. 8.5, lat. 3 mm.

Insulae Philippinae (sine loco acurrato) ex coll. O. Schütze.

Prothorax and elytra as in *interruptolineatus* m.[38] but pure white striped, the former more attenuate in front and the white stripe, above the anterior coxae, equally curved upwards, inclosing a black elliptic space. Scutellum linear, a little broader at the base, acuminate at the top. The white incrusted stripe on the second interspace of the elytra surpassing the middle and continuing to the apical third part of the third interspace, that of the sixth interspace abbreviated in front and closely connected with the former at the apex. Pygidium parabolic, as long as broad, with moderately remote, ringed punctures. Prosternum white in the middle of the posterior margin, and thence upwards to the posterior angles of the prothorax.

Eugithopus bilineatus m., very closely allied to *interruptolineatus* m.,[39] I formerly took to be a female of the genus *Cercidocerus;* but it should be transferred to *Eugithopus,* because this

[37] Ent. Mitt. Berlin (1914) 313, pl. 5, fig. 7 and 7*a*.
[38] Ent. Zeitung Stettin (1908) 190.
[39] Loc. cit.

vicarious species from Borneo certainly has likewise an unenlarged club in the male. The same is true of *Cercidocerus flavoplagiatus* Heller,[40] which is at most a local variety of *Eugithopus elegans* Roelofs.[41] The former comes from Davao, on the southern coast of Mindanao, the first from Surigao, a province in northeastern Mindanao. It differs from the type species by the different shape of the pale spots on the elytra; namely, the subbasal spot is not pointed inward, but nearly rectangular transverse, the postmedian band is not prolonged, but sharply delimited behind, and the pale sutural stripe, in the front third, extends gradually towards the base to the first and second intervals.

30. CRYPTODERMA FRACTISIGNUM sp. nov. Male.

C. laterali (Boh.) affinis, sed aliter albosignatum; antennis articulo tertio duobus sequentibus sumptis breviore; prothorace latitudine linea alba dorsali aequali, dorso reticulato-, ad latera varioloso-punctato ut in laterali lineis albo-incrustatis tribus; elytris post minus attenuatis, sutura ante scutellum coarctata, margine basali intra striam quintam, lobis quatuor productis, linea alba submarginali, in primo triente ramum brevissimum intus imittente, sutura, in primo triente ut pictura angulata, communi, in suturae secundo triente incipiente atque callum, subapicalem versus currente, albo-incrustatis. Long. 11, lat. 4 mm.

Insula Panay (ex coll. C. F. Baker 20933).

This is one of the few species of the genus without a white cruciform design on the elytra, belonging near *lateralis* Boh. Antennæ with the third joint shorter than the two following combined, club barely twice as long as broad. Prothorax as broad as the middle line is long, coarsely reticulate; the sides more flattish and cicatrized-punctate. Scutellum oblong-ovate, inclosed by the suture. Elytra (of the male) with four denticles on the basal margin, towards the apex less attenuate than in *lateralis* Boh.; suture in the first third narrowly bordered with white; the white lateral stripe, on the fifth interspace, extends but a little beyond the first third of the elytra and forms there a short branch, extending inwards to the fourth interspace and then prolonged on the sixth stripe, away over the subapical callosity, to the apex of the first interspace. Suture in second third with an angular white band, the branches directed backward

[40] Philip. Journ. Sci. § D 8 (1913) 147, fig. 3.
[41] Notes Leyd. Mus. 13 (1891) 145, pl. 8, fig. 5.

and connecting the white lateral stripe. Hind border of the prosternum with sharp rectangular angles edges on the sides.

SCARABÆIDÆ

CETONIINI

PODOPOGONUS BOETTCHERI Moser. Male. Plate 1, fig. 7; text fig. 4.

This genus was described by J. Moser [42] from a single, supposedly male, specimen. A specimen before me, doubtlessly male, with only two anterior tibial teeth, collected by the late O. Schütze on Mount Critas near Montalban, Rizal Province, Luzon, shows that Moser's statement of the sex is erroneous in that he believed a female to be a male. The illustration (Plate 1, fig. 7) of the male specimen from Mount Critas, to which I add a text figure of the forceps, proves this, and also that both sexes of this genus have a broad median impression along the abdomen.

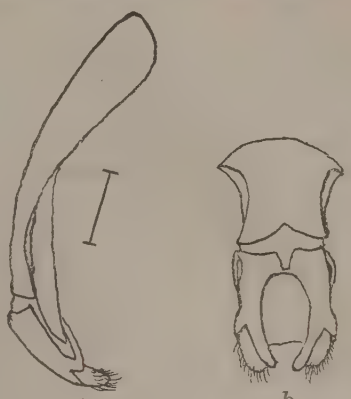

FIG. 4. *Podopogonus boettcheri* Moser, male; *a*, forceps, lateral aspect; *b*, forceps, view from behind.

LUCANINI

W. Schultze [43] makes no mention of the occurrence of *Gnaphaloryx opacus* Burm. in the following localities: LUZON, Tayabas, Malinao (C. F. Baker legit); MINDANAO, Zamboanga (F. C. Hadden legit).

To other known localities of *Metallactulus parvulus* Hope I can add PANAY (C. F. Baker); MINDANAO, Zamboanga and Kabasalan (F. C. Hadden); LUZON, Mount Maquiling (C. F. Baker).

FIGULINI

Copious material of *Nigidius*, collected by Mr. F. C. Hadden and kindly sent me for study, has convinced me that *Nigidius montanus* m.[44] is based upon large specimens and is *boneulli* Boileu [45] = *laevicollis* Jakowleff (nec Westw.),[46] and *N. taurus* Jak. = *laevicollis* Westw. *Nigidius bonneuli* Boil. has priority over *montanus* m.

[42] Deut. Ent. Zeitschr. Berlin (1917) 18.
[43] Cat. Philip. Coleop. (1915) 161.
[44] Ent. Mitt. Berlin-Dahlem 6 (1917) 171.
[45] Le Naturaliste 27 (1905) 18.
[46] Hor. Ent. Ross. 34 (1900) 642.

ILLUSTRATIONS

PLATE 1

FIG. 1. *Sandracottus angulifer* sp. nov., male, Mindanao.
2. *Eupyrgops semperi* Faust (= *banahaonis* Heller), female, Luzon.
3. *Pachyrrhynchus orbifer murinus* subsp. nov., Luzon.
4. *Pachyrrhynchus stellulifer abranus* subsp. nov.
5. *Pseudottistira subtuberculata* g. et sp. nov., Luzon.
6. *Agelasta basimaculata* sp. nov., Luzon.
7. *Podopogonus boettcheri* Mos., male, Luzon.
8. *Epaphra minor* sp. nov., Luzon.
9. *Eugithopus bilineatus* sp. nov., Luzon.
10. *Enispia samarana* sp. nov., Samar.
11. *Tragopus* (?) *sexpunctatus* sp. nov., Mindanao.
12. *Metapocyrtus currani* sp. nov., Luzon.
13. *Alcides alfkeni* sp. nov., Luzon.
14. *Alcides haddeni* sp. nov., left elytron, Luzon.
15. *Acicnemis haddeni* sp. nov., Luzon.
16. *Alphaeus alboplagiatus* sp. nov., Samar.
17. *Pachyonyx inversa* sp. nov., Mindanao.

TEXT FIGURES

FIG. 1. *Cereopsius marmoratus* sp. nov., male.
2. *Glenea vestalis* sp. nov., female.
3. *Pseudottistira subtuberculata* g. et sp. nov.; *a*, lateral aspect; *b*, ventral aspect.
4. *Podopogonus boettcheri* Moser, male; *a*, forceps, lateral aspect; *b*, forceps, view from behind.

PLATE 1.

NEW OR LITTLE-KNOWN TIPULIDÆ FROM EASTERN ASIA (DIPTERA), XIX [1]

By CHARLES P. ALEXANDER

Of Amherst, Massachusetts

THREE PLATES

The majority of the crane flies discussed at this time are from western China, mostly from Mount Omei, Szechwan, where they were taken by my friend the Reverend Mr. George M. Franck. A few others, preserved in the United States National Museum through the kindly interest of the collector, were taken in Sumatra by Mr. Edward Jacobson. A small number of species were taken on various islands to the east of Wallace's Line and so from the Australasian rather than the Oriental Region. Such specimens were taken in Celebes by my friend and former student Mr. Charles F. Clagg, and in New Caledonia, collected by Mr. Jean Risbec. Still further material, now contained in the Hungarian National Museum and received for study through the kindness of Dr. Z. Szilady, is from New Guinea. Except where stated otherwise, all types of novelties described at this time are in my own collection. I wish to extend my cordial thanks to all of the above-mentioned entomologists for this continued aid in the study of the Asiatic and Australian Tipulidæ.

TIPULINÆ

TIPULA (VESTIPLEX) DESERRATA sp. nov. Plate 1, fig. 1; Plate 2, fig. 25.

Antennæ 12-segmented, unusually short; flagellum bicolorous; terminal two segments more or less fused; mesonotal præscutum gray with four grayish brown stripes that are narrowly bordered by dark brown; apices of knobs of halteres brightened; femora obscure yellow, the tips blackened; wings whitish to pale yellowish subhyaline, variegated by dark and pale brown; a large dark brown postarcular darkening; dark area in stigmal field interrupted by a pale spot at proximal end of stigma; male hypopygium with basistyle armed with a black spine; cerci of ovipositor slender, with smooth valves.

[1] Contribution from the entomological laboratory, Massachusetts State College.

Male.—Length, about 16 millimeters; wing, 19.

Female.—Length, about 18 to 20 millimeters; wing, 16.5 to 18.5.

Frontal prolongation of head reddish yellow, darker above; nasus elongate, brownish black; palpi dark brown, paler at incisures. Antennæ (male) short, less than the palpi; basal four segments yellow, the succeeding segments bicolorous, darkened basally, the remainder obscure yellow; only twelve antennal segments, the small apical one further partly fused with the penultimate; verticils considerably exceeding the segments in length. Head with front and orbits light yellow, the vertex infuscated.

Mesonotal præscutum gray, with four grayish brown stripes that are narrowly bordered by dark brown, the intermediate pair confluent at cephalic ends; each scutal lobe with two dark areas that are unmargined; median area of scutum pale; scutellum and mediotergite gray; a narrow, continuous, dark brown median line extending from scutum to base of abdomen. Pleura chiefly pale, the pleurotergite in front golden yellow. Halteres darkened, the apices of knobs narrowly yellow. Legs with the coxæ and trochanters yellow; femora obscure yellow, the tips narrowly and conspicuously blackened; tibiæ and tarsi brown to dark brown. Wings (Plate 1, fig. 1) with the ground color whitish to pale yellowish subhyaline, the disk chiefly covered by pale brown; prearcular cells light yellow, cells C and Sc more brownish yellow; darker brown markings, as follows: A large postarcular area in bases of cells R and M; origin of Rs; stigma, the last preceded by a conspicuous white spot in the center of a darkened cloud that extends from tip of Sc along outer end of Rs to stigma and thence along the anterior cord; posterior cord; a spot at near midlength of Cu and a seam at end of vein 2d A less distinctly darkened; the ground subhyaline areas include the subbasal portions of cells R and M; most of cell R_1 before the stigma; a broad fascia beyond the stigma, extending from costa into base of cell M_3; an area near outer end of cell M; white marginal spots in cells 1st A and 2d A (two areas in each cell); basal portions of cells Cu and 1st A variegated with whitish or pale yellow; veins brown. Veins R_3 and R_{4+5} with abundant macrotrichia. Venation: R_{1+2} entire but pale yellow, without trichia; Rs long, approximately three times m-cu, the latter somewhat variable in position, from just before to just beyond the fork of M_{3+4}.

Abdominal tergites obscure yellow, the basal segments in male with a very conspicuous brownish black median stripe; in female, the basal and intermediate tergites are reddish yellow, darker sublaterally, the borders narrowly grayish; subterminal segments and genital shield blackened. Male hypopygium with the tergite divided medially by pale membrane or very thin chitin, with a serrulate blackened plate on either side of midline. Basistyle (Plate 2, fig. 25, *b*) with a powerful black spine. Dististyles *id, od,* as figured. Ovipositor with the cerci entirely abnormal for the subgenus, almost as in the typical subgenus of *Tipula,* slender, not transverse, the margins without denticulations; hypovalvæ developed, extending caudad to end of genital shield.

Habitat.—China (Szechwan).

Holotype, male, Kwanhsien, altitude 3,500 feet, May 27, 1930 (*Franck*). Allotopotype, female. Paratopotype, female, in poor condition.

Of the two score species of *Vestiplex* now known from eastern Asia (including Siberia, Tibet, China, Japan, and Formosa, as well as the Himalayas) the present fly seems unquestionably to find its nearest ally in *Tipula* (*Vestiplex*) *asio* Alexander (Japan: Honshiu), which differs especially in the structure of the male hypopygium. The slender, nonserrate cerci of the ovipositor differ from those of all species of the subgenus known to me, but, unfortunately, the female sex of several species, including *asio,* is still undescribed.

TIPULA (VESTIPLEX) KWANHSIENANA sp. nov. Plate 1, fig. 2; Plate 2, fig. 26.

Mesonotal præscutum silvery, with four brown stripes that are narrowly bordered by darker brown, the intermediate pair with their anterior ends abruptly paler; femora obscure yellow, the tips blackened, preceded by a clearer yellow ring; wings pale yellow and brown, variegated with darker brown areas, including a conspicuous postarcular one; m-cu connecting with M_{3+4} at two-thirds the length; male hypopygium with caudal margin of tergite terminating in two widely separated rounded lobes; outer dististyle elongate, narrow, sinuous; basistyle unarmed.

Male.—Length, about 13 millimeters; wing, 15.6.

Frontal prolongation of head light yellow above, slightly infuscated laterally, nasus long and slender, black; palpi brownish black. Antennæ with scape and pedicel light yellow, flagellum black; flagellar segments subcylindrical, the basal enlargements feebly developed; longest verticils subequal in length to the seg-

ments; terminal segment reduced. Head yellow, the center of vertex darkened.

Ground color of mesonotal præscutum silvery on sides, the interspaces more yellowish, the disk with four brown stripes that are very narrowly bordered by darker brown; anterior ends of intermediate stripes abruptly paler, more olive; scutal lobes yellow pollinose, each with two dark brown areas; scutellum and mediotergite similar; a capillary brown vitta extends from the transverse suture to the abdomen. Pleura chiefly golden yellow. Halteres with base of stem and apex of knob yellow, the remainder of stem pale brown, the base of knob dark brown. Legs with coxæ light yellow pollinose; trochanters yellow; femora obscure yellow, the tips rather narrowly but conspicuously blackened, preceded by a slightly clearer yellow ring; tibiæ dark brown, the bases paler; tarsi brownish black. Wings (Plate 1, fig. 2) strongly narrowed at base; ground color pale yellow, the coloration chiefly concealed by an extensive grayish brown pattern that covers most of the disk, exposing the ground as follows: Prearcular region beyond the post-arcular darkening; a very tiny area before origin of Rs; cell R_1 before stigma almost entirely pale; post-stigmal crossband to cell 1st M_2; near outer end of cell M; posterior half of cell 1st M_2; in basal half of cell Cu; two spots in outer end of cell 1st A; both ends of cell 2d A; cell C chiefly pale; darker brown areas in bases of cells R and M; origin of Rs and along vein Cu in alignment with this; stigma; entire wing tip unvariegated by pale color; veins dark brown. Venation: m-cu connecting with M_{3+4} at two-thirds the length.

Abdominal segment one and basal ring of two light golden yellow, darkened medially; succeeding segments almost uniformly dark brown, the caudal borders of segments two to four faintly paler; basal sternites yellow, the outer segments dark, gray pruinose; outer segments, with hypopygium, dark brown. Male hypopygium (Plate 2, fig. 26) with the tergite separated from sternite by membrane; basistyle complete, with a triangular area partially delimited from sternite dorsad of tergite. Ninth tergite, *9t*, as viewed from above, with two flattened reddish lateral lobes, widely separated, clothed with delicate pale setæ; space between lobes truncate and blackened; dorsomedian area of tergite pale but not membranous, as is the case in several other species of *Vestiplex;* viewed laterally, there is seen to be a second lobe ventrad of the one described, the margin between the two with abundant pale setæ. Basistyle, *b*, and eighth sternite, *8s*, without spines. Outer dististyle, *od*, unusually long and slen-

der, sinuous at near midlength, the basal half stouter than the outer half. Inner dististyle, *id,* with apical beak slender, blackened, separated from the subterminal lobe only by a linear curved split.

Habitat.—China (Szechwan).

Holotype, male, Kwanhsien, altitude 3,000 feet, August 16, 1930 (*Franck*).

The closest ally of the present fly is *Tipula* (*Vestiplex*) *arisanensis* Edwards (Formosa), which differs in the even smaller size, pale basal flagellar segments, unbordered præscutal stripes with the median one entire on anterior portion, and the details of wing pattern, such as the restriction of the yellow ground in bases of cells R and M, before the stigma and in base of cell 2d A, and its increase in amount before the origin of Rs. Both species show the uniformly darkened wing tip and the unusual position of m-cu before the fork of M_{3+4}. Unfortunately the male sex of *arisanensis* is still unknown.

TIPULA (ACUTIPULA) DICLADURA sp. nov. Plate 1, fig. 3; Plate 2, fig. 27.

Belongs to the *munda* group; allied to *biramosa;* mesonotal præscutum, scutum, and scutellum almost uniformly brownish gray; mediotergite light yellow, the center of the disk dark brown; pleura yellow; wings tinged with brown, the costal region and stigma darker; male hypopygium with the median lobe of tergite wide, depressed, the caudal margin deeply notched, each lobule densely set with small black spines; inner dististyle with a powerful curved blade and a slender axillary spine, additional to the usual beak.

Male.—Length, about 24 millimeters; wing, 27.5. Hind leg, femur, 20; tibia, 25; basitarsus, about 36.

Frontal prolongation of head dark reddish brown; nasus dark brown, elongate; palpi dark brown. Antennæ relatively short; scape brown, pedicel yellow; flagellar segments weakly bicolorous, the basal enlargement darkened, the apical portion obscure yellow; longest verticils more than one-half longer than the segments. Head brown, the posterior orbits narrowly yellowish.

Pronotum brownish yellow, the scutellum darker. Mesonotal præcutum, scutum, and scutellum almost uniformly dark brownish gray, the præscutum with very indistinct darker stripes, the lateral margins obscure brownish yellow; mediotergite light yellow, with a large brown area occupying much of disk. Pleura, including propleura and dorsopleural membrane, uniformly yellow. Halteres darkened, the apices of knobs obscure yellow.

Legs very long; coxæ and trochanters yellow; femora light brown, the tips rather narrowly blackened; tibiæ and tarsi dark brown. Wings (Plate 1, fig. 3) tinged with brown; cell C and especially cell Sc darker brown; stigma brown; obliterative areas before cord reduced in size, inconspicuous. Venation: Rs short, subequal to m-cu; petiole of cell M_1 subequal to m.

Abdominal tergites brownish yellow, the basal segments narrowly darkened sublaterally, the fifth and succeeding segments, including hypopygium, brownish black. Male hypopygium with the median lobe of tergite (Plate 2, fig. 27, 9*t*) broad, depressed, the caudal margin with a deep U-shaped notch that has about the same general outline as that of the lobules, the latter densely set with blackened spinous points. Outer dististyle, *od*, broad on basal half, the apical portion somewhat narrower. Inner dististyle, *id*, with the outer portion a powerful flattened curved blade, glabrous, terminating in an acute point; in axil between this blade and the usual apical beak of style a slender needle-like rod, its tip subacute; apical beak compressed, the margin flattened.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 4,500 feet, August 8, 1931 (*Franck*).

The only other member of the group that has a hypopygium at all like that of the present fly is *Tipula* (*Acutipula*) *biramosa* Alexander, likewise from Szechwan. This species has the median lobe of the tergite narrow, only feebly notched, and with the inner dististyle of quite different conformation.

TIPULA (ACUTIPULA) PLATYCANTHA sp. nov. Plate 2, fig. 28.

Belongs to the *munda* group; allied to *oncerodes;* mesonotal præscutum, scutum, and scutellum dark gray; mediotergite darkened medially, bordered by yellow; pleura yellow; obliterative areas of wing inconspicuous; male hypopygium with the median lobe of tergite narrow, the tip simple; inner dististyle with a slender blackened beak, the outer lobe very broad and flattened, terminating in a small spine, with a second spine on outer margin before apex.

Male.—Length, about 20 to 25 millimeters; wing, 20.5 to 28.

Frontal prolongation of head yellowish brown, narrowly lined with darker; nasus elongate, blackened; palpi black. Antennæ with scape brownish yellow; pedicel obscure yellow; flagellum weakly bicolorous, the basal enlargement darkened, the remainder obscure yellow. Head brownish gray, the posterior orbits nar-

rowly pale; anterior vertex relatively narrow, at narrowest point about twice the diameter of scape.

Mesonotum chiefly dark gray, the parascutella yellow; mediotergite dark medially, broadly margined with yellow. Pleura yellow. Halteres brown, the base of stem narrowly pale. Legs with coxæ and trochanters pale yellow; femora obscure yellow, the tips blackened; tibiæ brown, the tips brownish black; tarsi chiefly brownish yellow, the apices of the segments narrowly darkened. Wings with a strong brown tinge, the prearcular region, cells C and Sc, and the stigma darker brown; obliterative area distinct before stigma but only slightly evident before the cord, much less so than in *oncerodes*. Venation: Petiole of cell M_1 variable, subequal to or shorter than m; m-cu at or just before fork of M_{3+4}.

Abdomen with basal four segments reddish brown, the tergites narrowly margined laterally with yellow, lined internally with a faint dusky wash; segments five to nine brownish black. Male hypopygium with the median lobe of tergite (Plate 2, fig. 28, 9*t*) unusually slender, narrowed to a simple point that is densely set with abundant black spinous points. Outer dististyle, *od*, a flattened, long-oval lobe, the apex obtuse. Inner dististyle, *id*, with the beak unusually slender, blackened; outer lobe of style very broad and flattened, terminating in a small spine, with a second spine on outer margin before apex.

Habitat.—China (Szechwan).

Holotype, male, Kwanhsien, altitude 4,000 feet, August 17, 1930 (*Franck*). Paratopotype, male, August 19, 1930 (*Franck*). Paratypes, 2 males, Mount Omei, altitude, 4,500 feet, August 8, 1931 (*Franck*).

The only near ally, *Tipula* (*Acutipula*) *oncerodes* Alexander, is generally similar in appearance to the present fly, but the male hypopygium, especially in the structure of the inner dististyle, is quite different.

TIPULA BIPENDULA sp. nov. Plate 1, fig. 4; Plate 2, figs. 29 to 31.

Mesonotal præscutum brownish gray, with four darker brown stripes; pleura uniformly light yellow; antennæ (male) relatively long; flagellum beyond basal segment black; wings strongly tinged with brown, cells C and Sc conspicuously darker brown; cell 1st M_2 small; abdomen orange, the tergites with a median black vitta that is narrowly interrupted; male hypopygium with a single dististyle; eighth sternite bearing a large pale lobe that is profoundly divided medially.

Male.—Length, about 15 millimeters: wing, 19; antenna, about 6.

Frontal prolongation of head dark brown, shiny; nasus elongate; palpi brownish black. Antennæ (male) relatively elongate; scape and pedicel clear light yellow; first flagellar segment brownish yellow; remainder of flagellum black, the extensive tips of the individual segments a trifle brightened; basal enlargements of segments moderately developed; longest verticils subequal to the segment. Head chiefly dark brown, the front pale yellow.

Mesonotal præscutum brownish gray, with four dark brown stripes that are but little conspicuous against the ground, the intermediate pair saparated by a more blackish median vitta; posterior sclerites of notum concealed in the unique type. Pleura uniformly light yellow.

Halteres dark brown, the base of stem narrowly pale yellow. Legs with the coxæ and trochanters pale yellow; femora obscure yellow, the tips narrowly but conspicuously brownish black; remainder of legs darker brown; claws (male) toothed. Wings (Plate 1, fig. 4) strongly tinged with brown; cells C and Sc darker brown, the color not involving the radial field, a little darker than the stigma; paler areas in outer ends of cells R_3 and R_5; obliterative areas restricted; veins dark brown. Macrotrichia of veins abundant; squama naked. Venation: R_{1-2} entire, with trichia on basal portion; cell 1st M_2 unusually small, subpentagonal; cell M_1 about twice its petiole; cell 2d A relatively narrow.

Abdomen chiefly orange, the tergites with a median black vitta that is narrowly interrupted at caudal borders of segments; hypopygium chiefly darkened. Male hypopygium (Plate 2, fig. 29) with the tergite, 9*t*, sternite, 9*s*, and basistyle all entirely separate by sutures. Ninth tergite (Plate 2, fig. 31, 9*t*) with caudal border deeply trifid, the lateral lobes more darkened than the short obtuse median lobe; lateral lobes with very delicate setulæ. Ventral end of basistyle protuberant, provided with long setæ. A single dististyle (Plate 2, fig. 30), near its base produced into a long erect black spine; outer portion of style produced backward into a diaphanous membrane. Membrane of eighth sternite produced into a depressed pale structure, 8*s*, that is split almost to base, leaving two lobes that in a position of rest hang pendant (Plate 2, fig. 31).

Habitat.—China (Szechwan).

Holotype, male, Kwanhsien, altitude 2,500 feet, May 27, 1930 (*Franck*).

The structure of the male hypopygium readily serves to distinguish the present fly from all other members of the genus known to me. The wing pattern is somewhat like that of *Tipula brunnicosta* Brunetti (northern India), which is otherwise an entirely different fly.

LIMONIINÆ

LIMONIINI

LIMONIA (LIBNOTES) DIPHRAGMA sp. nov. Plate 1, fig. 5.

Mesonotal præscutum yellow with two darker intermediate stripes, the lateral borders darkened; antennal flagellum yellow; pronotum dark brown; wings pale yellow, with a restricted pale brown pattern; free tip of Sc_2 lying its own length before R_2; supernumerary crossveins in cells R_3 and R_5; abdominal tergites yellow, with a median brownish black stripe; ovipositor with small, weak cerci.

Female.—Length, about 10 millimeters; wing, 13 by 3.5.

Rostrum and palpi brownish black. Antennæ with basal segments dark; flagellum yellow. Head buffy yellow.

Pronotum yellow, dark brown laterally. Mesonotal præscutum with the ground color yellow, with two intermediate darker stripes that are separated only by a capillary pale vitta; lateral border of præscutum darkened; scutal lobes slightly darkened; scutellum pale yellow. Pleura pale yellow, with a conspicuous dorsopleural longitudinal stripe across the dorsal sclerites and pleural membranes; ventral pleurites not darkened. Halteres elongate, pale, the knobs dark brown. Legs with the coxæ and trochanters pale yellow; femora yellow, with a narrow brown subterminal ring; tibiæ and tarsi brownish yellow, the terminal tarsal segments darkened. Wings (Plate 1, fig. 5) relatively broad, as shown by the measurements; pale yellow, with a restricted pale brown pattern, distributed as spots and seams along the crossveins and deflections of longitudinal veins, and as longitudinal washes on veins R_3, M_{1+2}, and Cu; axillary region and posterior border of wing in medial and cubital fields darkened; veins pale yellow, darker in the clouded areas. Venation: Free tip of Sc_2 lying distinctly before the level of R_2, so that Sc_2 and R_1 are subequal; two supernumerary crossveins in outer radial field, one in cell R_3 about its own length proximad of R_2, the other in cell R_5, about its own length beyond the long, arcuated

m; in addition to the above, both wings of the type show weak crossveins almost at the wing tip in outer ends of cells R_5 and 2d M_2; these are variable in length and position in the two wings of the type and are presumably adventitious (not shown in figure); m-cu at about one-third the length of cell 1st M_2.

Abdominal tergites yellow, with a conspicuous median brownish black stripe; sternites more uniformly yellow. Genital segment pale yellow. Ovipositor with very small and weak cerci.

Habitat.—China (Szechwan).

Holotype, female, Mount Omei, on mossy cliffs in river gorge, altitude 3,600 feet, July 27, 1932 (*Franck*).

The only other described *Libnotes* with two supernumerary crossveins in the wing is *Limonia* (*Libnotes*) *regalis* (Edwards) of the higher mountains of Formosa. Compared with the allotype female of this latter species in my collection, the present fly differs conspicuously in the diagnostic features listed above. The type is apparently slightly teneral but with the colorational pattern firmly indicated. If the outer adventitious crossveins at the wing tip should prove to be a constant feature, the present fly would be unique in this respect.

LIMONIA (LIBNOTES) CHRYSOPHÆA sp. nov. Plate 1, fig. 6.

General coloration of body orange; legs chiefly black, the femoral bases orange-yellow, tarsi paling to obscure yellow; wings golden yellow with about the outer tenth abruptly dark brown; free tip of Sc_2 some distance before the level of R_2; inner ends of cells 2d M_2 and M_3 about on a level; anal veins gently convergent at bases.

Male.—Length, about 11 millimeters; wing, 15.5.

Female.—Length, about 11 millimeters; wing, 15.5.

Rostrum and palpi brown. Antennæ brown; flagellar segments short-oval, the outer segments more elongate; terminal segment long, the outer two-fifths narrowed and pointed; verticils unilaterally arranged, the longest more than two times the segments. Head obscure fulvous, the front silvery white; anterior vertex of moderate width, subequal to the diameter of scape.

Thorax almost uniformly orange, the præscutum with indications of four more greenish stripes. Halteres yellow, the knobs infuscated. Legs with the coxæ and trochanters obscure orange; femora orange-yellow basally, the tips very broadly blackened, on forelegs including nearly the outer three-fourths, on posterior legs including a little less than the outer half; ti-

biæ brownish black; tarsi paling to brownish yellow or obscure yellow. Wings (Plate 1, fig. 6) rich golden yellow, the extreme tip, including about the outer tenth, abruptly dark brown; stigmal region more saturated golden yellow; veins yellow, brown in the apical darkening. Venation: Sc_1 ending beyond level of r-m, Sc_2 close to its tip; Rs very gently arcuated; free tip of Sc_2 some distance beyond R_2, the latter evenly curved into R_1; inner ends of cells 2d M_2 and M_3 about on a level; m-cu at near one-third the length of cell 1st M_2; anal veins gently convergent at bases.

Abdomen orange throughout.

Habitat.—North Celebes (Minahassa).

Holotype, male, Roeroekan, altitude 4,000 feet, April 13, 1931 (*Clagg*). Allotopotype, female, April 17, 1931 (*Clagg*).

This striking crane fly needs no comparison with any other described species of the subgenus. The nature of the wing pattern is like certain species of the tipuline genus *Pselliophora* Osten Sacken, such as *compedita* (Wiedemann) but in the present fly the wing tip is even more narrowly darkened. By Edwards's key to the species of *Libnotes*,[2] the fly runs to couplet 28, disagreeing with all other species in the coloration of the body, wings, and legs.

LIMONIA (LIBNOTES) NIGERRIMA sp. nov. Plate 1, fig. 7.

Allied to *imponens;* coloration of entire body black; knobs of halteres blackened; wings narrow, the costal border infuscated; free tip of Sc_2 and R_2 in transverse alignment; vein 2d A strongly sinuous.

Male.—Length, about 11 millimeters; wing, 13 by 2.3.

Rostrum and palpi black. Antennæ brownish black, the scape more intensely so; flagellar segments oval; verticils relatively short. Head grayish brown; anterior vertex reduced to a linear silvery strip.

Thorax uniformly brownish black or black. Halteres dusky, the knobs brownish black. Legs with the coxæ black; trochanters brownish black; remainder of legs broken. Wings (Plate 1, fig. 7) narrow, weakly tinged with brown; prearcular region, cells C and Sc, and the elongate stigma darker brown, forming a narrow but continuous costal border; veins dark brown. Macrotrichia of vein C very small, especially near the wing base. Venation: Free tip of Sc_2 and R_2 in transverse alignment; all

[2] Journ. Fed. Malay States Mus. 14 (1928) 74–80.

radial and medial veins strongly decurved near margin; m long and arcuated, about one-third the total length of cell 1st M_2; m-cu at near one-fourth the length of cell; vein 2d A strongly sinuous.

Abdomen black; hypopygium obscure yellow. Male hypopygium of the typical form of *Libnotes*, with the tubercle of the ventral dististyle, together with its setæ, long and conspicuous; rostral spines long and slender.

Habitat.—North Celebes (Minahassa).

Holotype, male, Roeroekan, altitudes 4,000 feet, April 11, 1931 (*Clagg*).

By both Osten Sacken's [3] and Edwards's [4] keys to the species of *Libnotes*, the present fly runs directly to *Limonia* (*Libnotes*) *imponens* (Walker), of South Celebes. The latter differs in the ochraceous coloration of the thorax, together with the wings being unmarked except for the stigmal darkening.

LIMONIA (LIMONIA) COXITALIS sp. nov. Plate 1, fig. 8; Plate 2, fig. 32.

Mesonotal præscutum obscure yellow with a median brown stripe and with the lateral margins darkened; femora brown, the tips narrowly yellow; wings with a faint grayish tinge; stigma brown, subcircular; male hypopygium with the ventromesal lobe of basistyle stout, ending in a slender glabrous lobe; rostral prolongation of dististyle a long yellow blade, with a single small setalike spine on outer margin at near midlength; gonapophyses without corrugated ridges.

Male.—Length, about 7 to 8 millimeters; wing, 8.5 to 9.5.

Rostrum and the reduced palpi brownish black. Antennæ with the scape black; remainder of organ broken. Head dark gray; eyes contiguous on vertex.

Pronotum obscure yellow above, dark brown laterally. Mesonotal præscutum with the ground color obscure yellow, with a median dark brown stripe and with the extreme lateral portions of the sclerite broadly darkened; scutal lobes dark brown, the median region more testaceous; scutellum dark brown; mediotergite more yellowish brown. Pleura almost entirely covered by a broad dark brown stripe, the posterior portion of the sternopleurite and the dorsal portions of the pteropleurite and pleurotergite obscure yellow. Halteres with the stems yellow, knobs broken. Legs with the fore coxæ dark brown, the remaining

[3] Berlin. Ent. Zeitschr. 31 (1887) 182–183.

[4] Journ. Fed. Malay States Mus. 14 (1928) 74–80.

coxæ and all trochanters obscure yellow; femora brown, the bases narrowly yellow, the tips narrowly but very conspicuously paling to yellow; tibiæ and tarsi pale brown, the outer segments of the latter darker. Wings (Plate 1, fig. 8) with a faint grayish or sandy tinge, the costal region more brownish yellow; stigma brown, subcircular, conspicuous; wing tip weakly suffused with brown; veins brown. Venation: Sc relatively long, Sc_1 ending about opposite five-sixths the length of Rs, with Sc_2 at its tip; Rs leaving R at an acute angle, the central portion more arcuated; R_2 and free tip of Sc_2 in transverse alignment; m-cu close to fork of M.

Abdomen brownish black, the intermediate segments more bicolorous, their bases broadly obscure yellow. Male hypopygium (Plate 2, fig. 32) with the caudal margin of tergite, 9*t*, evenly and convexly rounded. Basistyle, *b*, elongate, the ventromesal lobe stout, its apex narrowed into a slender glabrous lobe. A single dististyle, *d*, the body of which is a small oval mass, much smaller than the lobe of basistyle; rostral prolongation a long, pale yellow, gently curved blade, at near midlength on outer margin with small setalike spine. Gonapophyses, *g*, with the mesal-apical lobe long and narrow, the margin of the blade not transversely corrugated, as in members of the *pendleburyi* group.

Habitat.—China (Szechwan).

Holotype, male, Chengtu, altitude 1,800 feet, April 18, 1932 (*Franck*). Paratopotype, male, April 26, 1932 (*Franck*).

The general appearance of the present fly is much as in various members of the *pendleburyi* group of the subgenus, all of which have the surface of the gonapophyses with a delicate transverse corrugation, whereas in this insect the apophyses are quite smooth. The yellow femoral tips and the peculiar structure of the basistyle (coxite) will readily separate the present fly from all other regional members of *Limonia*.

LIMONIA (LIMONIA) QUANTILLA sp. nov. Plate 1, fig. 9; Plate 2, fig. 33.

General coloration of mesonotum reddish brown, the præscutum with a capillary dark brown median stripe; dorsal half of thoracic pleura darkened, the ventral portion suddenly light yellow; legs brownish black; wings tinged with brown; m-cu about one-third its length beyond fork of M; male hypopygium with the caudal margin of tergite truncated; basistyle slender, the ventromesal lobe basal in position; ventral dististyle with the rostral prolongation slender, without spines.

Male.—Length, about 3 millimeters; wing, 3.5.

Rostrum and palpi black. Antennæ brownish black throughout; flagellar segments oval. Head dark brown; anterior vertex reduced to a linear strip.

Pronotum pale brown. Mesonotal præscutum reddish brown, with a capillary darker brown stripe extending from the cephalic margin, a little widened behind on posterior third; scutal lobes reddish brown, their mesal edges narrowly darkened; scutellum infuscated; mediotergite reddish brown. Pleura with the dorsal portion darkened, the ventral half suddenly pale yellow. Halteres dusky, the base of stem very narrowly pale. Legs with the coxæ and trochanters light yellow; remainder of legs brownish black, only the femoral bases restrictedly brightened. Wings (Plate 1, fig. 9) rather strongly tinged with brown; stigma oval, slightly darker brown; veins and macrotrichia darker brown. Venation: Sc_1 ending about opposite five-sixths the length of Rs, Sc_2 at its tip; Rs only a little longer than R_{2+3}; free tip of Sc_2 and R_2 in transverse alignment; m-cu between one-third and one-half its length beyond the fork of M.

Abdominal tergites dark brown, the outer sternites more obscure yellow; hypopygium dark brown. Male hypopygium (Plate 2, fig. 33) with the tergite, 9*t*, narrowed outwardly, the apex truncate, all setæ not far from margin. Basistyle, *b*, elongate, the cushionlike ventromesal lobe on basal half, provided with abundant erect setæ. Dorsal dististyle a powerful blade, the tip decurved. Ventral dististyle, *vd*, with the body of style an oval pale lobe, set with long erect setæ that are fully as long as the diameter of the lobe; rostral prolongation a long yellow curved rod, of blade, without evident spines. Gonapophyses, *g*, with the mesal-apical lobe ending bluntly but with the tip directed laterad into a point.

Habitat.—Sumatra (west coast).

Holotype, male, Fort de Kock, altitude 920 meters, 1926 (*Jacobson*).

Limonia (*Limonia*) *quantilla* is one of the smallest species of the subgenus so far made known. It is allied to the larger *L.* (*L.*) *flavohumeralis* Alexander and *L.* (*L.*) *melanopleura* Alexander, both of the Philippines, all three forms having the same general structure of the male hypopygium, but with the details different, especially in the tergite. The coloration of the body and position of m-cu further separate the present fly from the two species mentioned. The even smaller *L.* (*L.*) *infantula* Ed-

wards (Borneo) belongs to a distinct group of the subgenus, the male hypopygium having lost the dorsal dististyle.

LIMONIA (DICRANOMYIA) RECTIDENS sp. nov. Plate 1, fig. 10; Plate 3, fig. 34.

Belongs to the *punctulata* group; a series of five or six brown clouds in cell C; male hypopygium with the ventral dististyle relatively small, the rostral prolongation long and slender, with two small straight spines placed on its lateral face near base; mesal-apical lobe of gonapophysis a simple acute blackened point.

Male.—Length, about 4 to 4.2 millimeters; wing, 4.8 to 5.

Female.—Length, about 5 to 5.5 millimeters; wing, 5.5 to 6.

Rostrum gray; palpi and antennæ black. Head dark gray.

Mesonotum gray, the præscutum with a median dark brown stripe that is more or less constricted opposite the level of the humeri, in cases weakly split by a pale vitta; lateral stripes less distinctly indicated; median region of scutum and the scutellum more testaceous. Pleura dark gray. Halteres pale, the knobs infuscated. Legs with the coxæ dark brown; trochanters obscure yellow; femora brownish yellow, the tips broadly blackened; tibiæ and tarsi brown, the outer segments of the latter dark brown. Wings (Plate 1, fig. 10) grayish, with a sparse darker brownish gray pattern, arranged as in the *punctulata* group; a series of five or six brown clouds in cell C; veins brown. Costal fringe moderately long. Venation: Tip of R_{2+3} strongly upturned at outer end and here without trichia.

Abdomen, including hypopygium, brownish black. Male hypopygium (Plate 3, fig. 34) with the tergite, 9*t*, notched medially, the caudal margin of the lobes thickened and provided with numerous setæ. Ventral dististyle, *vd*, small, as compared with *subpunctulata;* rostral prolongation long and slender, with two small straight spines that are inserted close together near the base of the prolongation and on its lateral aspect; inner spine a trifle longer than the outer; both spines shorter than the apex of the prolongation beyond the outer spine. Gonapophyses, *g*, with the mesal-apical lobe a short simple acute blackened point.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 4,200 feet, June 29, 1932 (*Franck*). Allotopotype, female, altitude 4,800 feet, July 4, 1932 (*Franck*). Paratopotypes, several males and females, altitude 3,500 feet, August 16, 1931; 4,200 feet, June 29 to July 2, 1932; 4,500 feet, July 29, 1929 (*Franck*). Paratypes, males, Kwanhsien, altitude 4,000 feet, August 16, 1930 (*Franck*).

Limonia (*Dicranomyia*) *rectidens* is most nearly allied to the Formosan *L.* (*D.*) *subpunctulata* Alexander, in the bispinous rostral prolongation of the male hypopygium, differing most evidently in the spotted costal cell of the wing, and the much smaller ventral dististyle of the male hypopygium. The status of *L.* (*D.*) *fascipennis* (Brunetti) has been discussed by the writer in another paper.[5]

LIMONIA (RHIPIDIA) FORMOSANA EXPANSIMACULA subsp. nov. Plate 1, fig. 11.

Male.—Length, about 3.3 to 3.8 millimeters; wing, 4 to 4.5.

Similar to typical *formosana* (Alexander), differing especially in the small size and details of the wing pattern.

Legs with the femora pale brown, the tips narrowly whitish, preceded by a broader subterminal ring. Wings (Plate 1, fig. 11) with the dark area at origin of Rs and tip of Sc_1 broadened behind, much wider in cell R than in the costal field, not quite reaching vein M.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 4,800 feet, July 4, 1932 (*Franck*). Paratopotype, male.

Limonia (*Rhipidia*) *formosana* (Alexander), first described as a variety of *rostrifera* (Edwards), is a valid species, with the dark area at midlength of cell Sc very restricted, not involving cells C or R, and without darkening at tip of vein 1st A.

HELIUS (RHAMPHOLIMNOBIA) PAPUANUS sp. nov. Plate 1, fig. 12; Plate 3, fig. 35.

Size small (wing, male, under 4.5 millimeters); mesonotal præscutum and scutum with orange or brownish orange stripes, the lateral borders and interspaces darker; r-m at or close to fork of Rs; m-cu strongly pointed at inner end; m-cu nearly its own length before fork of M; dark area in outer end of cell R in alignment with the m-cu crossvein, not connected with the broken crossband at midlength of cells R and M.

Male.—Length, excluding rostrum, about 4 millimeters; wing, 4 to 4.2; rostrum, alone, about 0.6.

Rostrum black; palpi whitish. Antennæ with scape and pedicel black; first flagellar segment pale, remainder of flagellum dark brown, somewhat darker outwardly. Head gray, the anterior vertex narrow, about equal in width to the diameter of scape.

Pronotum obscure yellow, darkened laterally. Cervical sclerites elongate, dark brown. Anterior lateral pretergites whitish.

[5] Philip. Journ. Sci. 46 (1931) 282.

Mesonotal præscutum with the disk largely covered by three orange or brownish orange stripes, the interspaces pale brown; lateral borders of sclerite narrowly dark brown; scutal lobes extensively orange or brownish orange, margined with brown; scutellum and mediotergite dark brown. Pleura traversed by a very broad dark brown stripe, the dorsopleural region and ventral sternopleurite more yellowish. Halteres pale, the knobs weakly darkened. Legs with the coxæ dark brown, the mid-coxæ paler basally; trochanters dark brown; femora obscure yellow basally, passing into dark brown, immediately before tip with a very narrow yellow ring; tibiæ dark brown, the extreme base and tip pale; tarsi chiefly obscure yellow. Wings (Plate 1, fig. 12) whitish, the prearcular region, cells C and Sc, and the wing tip in cell R_3, light yellow; a restricted reticulate brown pattern, including the stigma, two larger areas in cell R, and narrow transverse spots in most of the cells, including two in each of cells R_5, 2d M_2 and M_3; m-cu and a spot in cell R above it narrowly brown; a wider, interrupted, brown crossband across cells R and M, terminating at end of vein 1st A; a brown spot at arculus and another in the axillary region of cell 2d A; most of the described brown spots and dots tend to form interrupted brown crossbands that lie more or less parallel with one another; veins pale brown, somewhat darker in the clouded areas. Costal fringe long and conspicuous; no macrotrichia on anterior branch of Rs or on anal veins. Venation: r-m at or just before fork of Rs; anterior branch of Rs diverging very strongly from R_{4+5}, cell R_3 at margin thus being very wide; inner end of cell 1st M_2 strongly pointed; m-cu nearly its own length before fork of M; cell 2d A relatively narrow.

Abdomen dark reddish brown, the caudal and lateral portions of the segments somewhat darker brown; hypopygium dark. Male hypopygium (Plate 3, fig. 35) with the outer dististyle, *od*, slender, its tip weakly dilated, the surface indistinctly roughened. Inner dististyle, *id*, longer, the apical third narrowed, the margin of style with conspicuous setigerous tubercles. Ædeagus, *a*, small. Gonapophyses, *g*, recurved, the tips acute.

Habitat.—New Guinea, New Britain.

Holotype, male, Laup, New Britain (*Dr. Hosking*); Macleay Collection, University of Sydney, through Mr. Frank H. Taylor. Paratype, male, Friedrich-Wilhelmshafen, New Guinea, June, 1896 (*Biró*); Hungarian National Museum.

Helius (*Rhampholimnobia*) *papuanus* is most nearly allied to the subgenotype, *H.* (*R.*) *reticularis* (Alexander), of Java, Bor-

neo, Celebes, Mindanao, and Luzon, differing in the diagnostic features listed above, especially the small size, the less heavily reticulated wing pattern, and the venation. The paratype had been recorded earlier by Riedel [6] as *Geranomyia annulipes* Hutton, which is now known as *Limonia* (*Zelandoglochina*) *huttoni* (Edwards).

ORIMARGA (ORIMARGA) LATISSIMA sp. nov. Plate 1, fig. 13; Plate 3, fig. 36.

General coloration dark gray; halteres pale yellow throughout; legs black; wings unusually broad, brownish yellow; costal fringe (male) short; macrotrichia on outer end of vein R_3; R_{1+2} only a little short than R_{2+3+4}; male hypopygium with one pair of gonapophyses yellow, densely set with spinous points.

Male.—Length, about 7 millimeters; wing, 7 by 2.2.

Female.—Length, about 8 millimeters; wing, 7.3 by 2.2.

Rostrum and palpi black. Antennæ black throughout; flagellar segments oval, the outer segments gradually smaller. Head dark gray.

Mesonotum and pleura uniformly dark gray. Halteres pale yellow throughout. Legs with the coxæ and trochanters dark blackish gray; remainder of legs black, the femoral bases somewhat paler. Wings (Plate 1, fig. 13) unusually broad, especially in male, widest just opposite or slightly beyond termination of vein 2d A; wings tinged with brownish yellow, cells C and Sc somewhat paler yellow; stigmal region vaguely darker; veins pale. Costal fringe abundant, short. Macrotrichia of veins relatively abundant, there being from ten to twenty on distal third or more of vein R_3. Venation: R_{1+2} elongate, only a little shorter than R_{2+3+4}; free tip of Sc_2 very vague, about its own length before R_2; cell 2d A very wide.

Abdomen, including hypopygium, black. Male hypopygium (Plate 3, fig. 36) with the phallosomic armature, *p*, conspicuous, consisting in part of a pair of spinous yellow lobes, united basally into a common stem, the entire outer end densely set with spinous points.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 3,600 feet, July 27, 1932 (*Franck*). Allotopotype, female, altitude 4,200 feet, June 29, 1932 (*Franck*). Paratopotype, male, altitude 4,800 feet, July 4, 1932 (*Franck*).

There are now seven species of *Orimarga* known from China, all of which have been taken at various altitudes on Mount

[6] Ann. Mus. Nat. Hungarici 18 (1921) 131.

Omei. The present fly differs from all members of the subgenus known to me by the unusual width of the wing, the increase in diameter being taken up chiefly by a widening of the anal cells.

Key to the Chinese species of Orimarga.

1. Vein R_2 of wings not more than its own length beyond fork of Rs..... 2.
   Vein R_2 of wings at least twice its length beyond fork of Rs (*seticosta*), usually fully four times this length..... 4.
2. Wings unusually narrow, especially on basal third; vein R_2 at end of of Rs and in transverse alignment with the basal section of R_5. *cruciformis* Alexander.
   Wings of normal width, vein R_2 about its own length beyond fork of Rs ..... 3.
3. Wing veins unusually glabrous, R_3 without trichia; male hypopygium with elements of phallosome conspicuous..... *nudivena* Alexander.
   Wing veins with abundant trichia, R_3 having a series over its entire length; male hypopygium with elements of phallosome inconspicuous. *æquivena* Alexander.
4. General coloration of thorax brownish gray, the pleura with a narrow black longitudinal stripe; costal fringe long and conspicuous in both sexes ..... *seticosta* Alexander.
   General coloration of thorax dark gray, including at least the dorsal pleurites; costal fringe short in both sexes..... 5.
5. Wings unusually wide, especially the anal field; R_{1+2} only a little shorter than R_{2+3}; femora black, paler only at bases..... *latissima* sp. nov.
   Wings of normal width; R_{1+2} approximately one-half R_{2+3}; femora brown to yellowish brown ..... 6.
6. Wings tinged with yellowish; male hypopygium with the outer dististyle gently arcuated; basistyle unarmed at base. *omeina* Alexander.
   Wings tinged with grayish brown; male hypopygium with outer dististyle bent beyond midlength at about a right angle; basistyle with a conspicuous lobe on mesal face at base..... *basilobata* sp. nov.

ORIMARGA (ORIMARGA) BASILOBATA sp. nov. Plate 1, fig. 14; Plate 3, fig. 37.

General coloration gray, the sternopleurite more reddish yellow; wings with costal fringe short; macrotrichia of outer veins numerous; free tip of Sc_2 far before R_2; R_{1+2} a little more than one-half R_{2+3}; male hypopygium with the basistyle bearing a large setiferous lobe on cephalic end of mesal face; outer dististyle with the outer third bent at about a right angle into a long apical spine.

Male.—Length, about 4 millimeters; wing, 4.5.

Rostrum light brown, gray pruinose; palpi brownish black. Antennæ black throughout; flagellar segments oval, with a short white pubescence and short verticils. Head gray, the anterior vertex silvery, at narrowest point nearly twice as wide as diameter of scape.

Mesonotum dark brownish gray. Dorsal pleurites dark brown, the sternopleurite and meral region light reddish yellow. Halteres pale, the knobs weakly infuscated. Legs with the coxæ yellowish testaceous, the fore coxæ a little darker; trochanters yellow; femora brown, the tips darker; remainder of legs dark brown. Wings (Plate 1, fig. 14) with a grayish brown tinge, the prearcular and costal regions paler, more whitish; veins pale brown. Costal fringe short; macrotrichia of veins beyond cord abundant and relatively long, on R_3 with about a score. Venation: Sc_1 ending shortly before fork of Rs; free tip of Sc_2 faint, far before R_2, at near mid-distance between the latter vein and tip of Sc_1; R_{1+2} a little more than one-half R_{2+3}; r-m and basal section of M_{1+2} both pale, nearly in transverse alignment; cell 2d A relatively narrow.

Abdomen brownish black; hypopygium a little brighter. Male hypopygium (Plate 3, fig. 37) with the mesal face of basistyle, *b*, at cephalic end with a large setiferous lobe. Outer dististyle at near two-thirds the length narrowed and bent at nearly a right angle into a long apical spine. Inner dististyle, *id*, with a single row of setæ along the face, additional to a small group on the inner margin at near midlength. Phallosome, *p*, with the ædeagus short, the gonapophyses appearing as slender, gently curved hooks.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 4,000 feet, July 14, 1931 (*Franck*).

The relations of this distinct species to the other described Chinese species of *Orimarga* are shown by the key accompanying the preceding species.

ORIMARGA (ORIMARGA) RISBECI sp. nov. Plate 1, fig. 15.

General coloration gray, the præscutum with three brown stripes; R_{1+2} ending opposite the fork of M_{3+4} and before midlength of the distance between end of Sc_1 and wing apex; m-cu at near one-third the length of Rs.

Female.—Length, about 4.8 millimeters; wing, 4.2.

Rostrum brown; palpi black. Antennæ black throughout; flagellar segments oval, terminal segment shorter than penultimate. Head gray.

Mesonotal præscutum gray, with three brown stripes, the broad median stripe slightly divided by a capillary gray vitta; scutal lobes with brown centers; posterior sclerites of mesonotum gray. Pleura gray, the ventral sternopleurite darker. Halteres pale, the knobs somewhat more yellow. Legs with the coxæ

brownish yellow, the fore and middle coxæ more pruinose; remainder of legs yellowish brown, the outer tarsal segments darker. Wings (Plate 1, fig. 15) tinged with whitish, the prearcular and costal cells slightly more yellowish, the bases of the anal cells a little darkened; veins pale. Macrotrichia on almost the entire length of the veins beyond cord, there being more than 30 on R_2. Venation: Sc_1 ending beyond midlength of Rs; tip of R_{1+2} opposite fork of M_{3+4} and before midlength of distance between end of Sc_1 and apex of wing; Rs angulated at origin; R_{2+3} a little shorter than R_{1+2}, without trichia; R_2 a little longer than r-m; m-cu about opposite one-third to two-fifths the length of Rs.

Abdomen brownish black, the genital segment ocherous, the ovipositor horn yellow.

Habitat.—New Caledonia.

Holotype, female, Plum Farm, January, 1929 (*Risbec*).

I take great pleasure in naming this species in honor of the collector, Prof. Jean Risbec. The fly is closest to *Orimarga* (*Orimarga*) *inornata* Skuse (New South Wales), differing in the coloration of the thorax and the details of venation, especially the shorter R_{1+2} and the position of m-cu.

HEXATOMINI

HEXATOMA (ERIOCERA) MINENSIS sp. nov. Plate 1, fig. 16.

Belongs to the *verticalis* group; mesonotum brownish gray, the præscutum with three dark brown stripes; vertical tubercle yellow, its summit more polished brown; knobs of halteres blackened; femora brownish black on outer half; wings strongly tinged with yellowish brown; stigma oval, dark brown; longitudinal veins narrowly and vaguely seamed with darker; numerous macrotrichia on outer radial veins; abdominal tergites black, the shield of ovipositor bright orange.

Female.—Length, about 16 millimeters; wing, 13.

Rostrum short, brownish yellow; palpi black. Antennæ with the scape and pedicel yellow, flagellum broken. Head with vertex, including the vertical tubercle, yellow, the latter somewhat polished brown at summit; sides of vertex behind darker and sparsely pruinose.

Mesonotum brownish gray, the præscutum with three dark brown stripes, the middle one entire; scutellum more heavily dusted with light gray. Pleura dark brown, more or less pruinose. Halteres yellow basally, the knobs and outer ends of stems blackened. Legs with the coxæ brown, pruinose; tro-

chanters yellow; femora brown on basal half, the outer half passing into brownish black; tibiæ brown, the tips a little darker; tarsi brownish black. Wings (Plate 1, fig. 16) strongly tinged with yellowish brown; cells C and Sc clearer light brown; stigma oval, usually small, dark brown; longitudinal veins narrowly and vaguely seamed with darker; veins brown, the outer radial veins and the cord darker brown. Costal fringe abundant, moderately long; abundant macrotrichia on outer radial veins, there being a series of about twenty-five on R_3. Venation: R_2 about one-half R_{1+2}, subequal to R_{2+3}; outer medial veins tending to become evanescent, as common in this genus; dark fold behind vein 2d A faint and little evident.

Abdominal tergites black; basal sternites a little paler. Ovipositor with its shield bright orange; cerci blackened at bases, more reddish on outer half; cerci of moderate length, slender.

Habitat.—China (Szechwan).

Holotype, female, Chengtu, along banks of Min River, altitude 1,700 feet, August 26, 1932 (*Franck*). Paratopotype, female.

Hexatoma (*Eriocera*) *minensis* is closest to *H.* (*E.*) *nipponensis* (Alexander), of Japan, differing most conspicuously in the wing pattern, presence of only three præscutal stripes, and the yellow vertical tubercle.

HEXATOMA (ERIOCERA) DIPLONEURA sp. nov. Plate 1, fig. 17.

Belongs to the *verticalis* group; size small (wing, female, under 8 millimeters); mesonotum almost uniformly dark brown, the præscutum with indications of three more blackish stripes; femora brownish yellow, the tips narrowly blackened; wings with a brownish tinge; no macrotrichia on outer branches of Rs, excepting a sparse series on R_5; cell M_1 lacking; a chitinized fold or weak spurious vein immediately behind and paralleling vein 2d A; valves of ovipositor unusually long and slender.

Female.—Length, about 7.5 to 9 millimeters; wing, 6 to 7.5.

Rostrum greatly reduced; palpi black. Antennæ with scape and pedicel obscure yellow to brownish yellow; flagellum broken. Head with vertical tubercle dark brown, entire; posterior portion of head dark gray pruinose.

Mesonotum almost uniformly dark brown, with indications of three more blackish stripes on præscutum. Pleura dark brown. Halteres obscure brownish yellow, the knobs brownish black. Legs with the coxæ dark brown; trochanters obscure yellow; femora brownish yellow, the tips narrowly blackened; tibiæ and tarsi brownish black. Wings (Plate 1, fig. 17) with a brownish tinge, cells C and Sc slightly darker; stigma oval, slightly darker

than the ground color; veins brown. Costal fringe abundant and relatively long; no macrotrichia on outer radial veins, excepting a sparse series on vein R_5. Venation: Cell M_1 lacking; a second vein or sclerotized fold lying immediately behind and parallel to vein 2d A.

Abdomen black. Ovipositor with the valves, especially the cerci, unusually long and slender, nearly straight; hypovalvæ extending to just beyond midlength of cerci, very slender.

Habitat.—China (Szechwan).

Holotype, female, Chengtu, along banks of Min River, altitude 1,700 feet, August 26, 1932 (*Franck*). Paratopotype, female.

Hexatoma (*Eriocera*) *diploneura* is readily told from *H.* (*E.*) *nipponensis* (Alexander) and other allied forms, by the diagnostic features listed above. The small size, glabrous outer radial veins, double vein 2d A, together with the unusually long and slender cerci, readily define the species.

GYNOPLISTIA (GYNOPLISTIA) NOVEM-PECTINATA sp. nov. Plate 1, fig. 18; Plate 3, fig. 38.

Belongs to the *jucunda* group; antennæ (male) 16-segmented, with nine branched segments, the branches elongate; head and thorax polished black; halteres uniformly blackened; wings whitish, with a restricted dark pattern; abdomen with segments one, seven, eight, and nine black, the remainder yellow, more darkened on their pleural portions; male hypopygium with a single dististyle that is tridentate at apex, the inner tooth a slender curved spine.

Male.—Length, about 8 millimeters; wing, 7.

Described from an alcoholic specimen.

Rostrum and palpi dark brown. Antennæ with scape and pedicel light yellow; axis of flagellum yellow, the branches and subapical portions of the axis of segments darkened, giving a bicolorous appearance to the individual segments, the ends being yellow, the central portion infuscated; apical simple segments darkened; flagellum with nine long branched segments, the antennal formula being $2 + 2 + 7 + 5$; first branch a trifle longer than the last branch, the latter about four times the segment; longest branch (about the fifth or sixth flagellar segment) about two-fifths as long as the entire flagellum. Head black.

Thorax polished black, the dorsopleural membrane paler; any pruinosity normally present destroyed by immersion. Halteres uniformly blackened. Legs with the coxæ black, clothed with very conspicuous elongate setæ; trochanters dark brown; remain-

der of legs broken. Wings (Plate 1, fig. 18) with the ground color whitish; cells C and Sc slightly more yellow; a restricted brown pattern, including small areas at arculus and origin of Rs, with a larger triangular area, including the stigma and anterior cord; a paler cloud in cells M, Cu, and 1st A at the level of Rs; posterior cord and outer end of cell 1st M_2 very narrowly seamed with brown; wing tip narrowly and very vaguely darkened; veins brown. Venation: Sc_1 ending opposite fork of Rs, Sc_2 at its tip; R_{2+3+4} subequal to r-m; R_{1+2} a little longer than R_2; cell M_1 lacking.

Abdomen with basal segment black; segments two to six light yellow, the lateral portions extensively darkened, becoming deeper and more clearly defined on outer segments; terminal segments uniformly blackened. Male hypopygium (Plate 3, fig. 38) with the dististyle, *d*, single, tridentate at tip, the inner spine long and slender, curved; surface of style with numerous microscopic punctures. Arms of phallosome, *p*, appearing as black slender structures, the outer margins microscopically roughened.

Habitat.—Central Celebes (Bontoe Batoe).

Holotype, alcoholic male, Latimodjong Mountains, altitude 4,500 to 6,000 feet, May 25, 1931 (*Clagg*).

The present species is most nearly allied to *Gynoplistia* (*Gynoplistia*) *jucunda* Osten Sacken and *G.* (*G.*) *octo-fasciata* Brunetti, both of South Celebes.

Key to the three Celebean species of the genus Gynoplistia.

1. Abdomen uniformly reddish yellow..... *jucunda* Osten Sacken.
   Abdomen variegated with black..... 2.
2. Abdomen with segments two to seven obscure yellow, the caudal margins broadly dark brown to produce a fasciate appearance; head gray; halteres bright orange-yellow..... *octo-fasciata* Brunetti.
   Abdomen with segments one, seven, eight and nine blackened, the intermediate sternites and tergites light yellow; head black; halteres uniformly blackened..... *novem-punctata* sp. nov.

All three members of the *jucunda* group discussed above have cell M_1 of the wings lacking and with a rather unusual number of simple terminal antennal segments in male, there being presumably eight in *jucunda* but only five in the present species. Antennal formula of *jucunda* male, $2 + 2 + 6 + ?$; of *novem-punctata* male, $2 + 2 + 7 + 5$; male of *octo-fasciata* unknown.

Elsewhere in the Australasian region half a dozen species of *Gynoplistia* occur in which cell M_1 is lacking (Papua, 1; southeastern Australia and Tasmania, 3; New Zealand, 2). These six species represent several distinct groups of the genus.

GYNOPLISTIA (GYNOPLISTIA) OCTO-FASCIATA Brunetti.

Gynoplistia 8-fasciata BRUNETTI, Rec. Indian Mus. 6 (1911) 307.

Described from a unique female specimen taken at Patunuang, South Celebes, January 1896 (*H. Fruhstorfer*). This type, in the Vienna Museum, was kindly loaned me for study by Dr. Hans Zerny in 1921. The following supplementary notes are given.

Female.—Length, 9 millimeters; wing, 7.7.

Dorsum of head densely covered with a microscopic appressed gray pubescence to appear like a heavy bloom. Antennæ apparently 16-segmented, the formula (female) being 2 + 2 + 4 + 8 or 2 + 6 + 8. Thoracic pleura with an appressed gray pubescence. Abdominal tergite one dark brown, tergites two to seven obscure yellow, with the caudal margin broadly, the lateral margins more narrowly dark brown; sternites similar, but the dark pattern much more extensive except on segments five and six, on sternites two to four including at least the posterior half of the segment. Genital segment and ovipositor yellowish horn color. Wings yellow, the pattern very much as in the female of *jucunda;* mark at origin of cells R and M distinct; band at level of origin of Rs interrupted in cell M.

The species differs from *jucunda* in the banded abdomen and in the gray coloration of the head.

ERIOPTERINI

GONOMYIA (LIPOPHLEPS) KERTÉSZIANA sp. nov. Plate 1, fig. 19; Plate 3, fig. 39.

General coloration dark brown; pleura with a yellowish white longitudinal stripe; wings grayish, sparsely variegated with bluish subhyaline areas; Sc ending just before origin of the strongly arcuated to feebly angulated Rs; abdomen, including hypopygium, dark brown; male hypopygium with three dististyles, the outer a long simple rod; phallosome without blackened hooks or spines.

Male.—Length, about 2.6 millimeters; wing, 3.

Rostrum and palpi black. Antennæ with the scape and pedicel black above, more yellowish beneath; flagellum brownish black, with the usual long verticils of this sex. Head pale yellow, the center of vertex shrunken, apparently darkened.

Pronotum and anterior lateral pretergites pale yellow. Mesonotum dark brown, the scutellum a very little brighter. Pleura blackish, with a yellowish white longitudinal stripe. Halteres dusky, the extreme apices of the knobs obscure yellow. Legs with the coxæ and trochanters obscure testaceous yellow;

remainder of legs broken. Wings (Plate 1, fig. 19) grayish, with bluish subhyaline areas in cells Cu, 1st M_2 and M_3; veins pale. Costal fringe long and conspicuous. Venation: Sc_1 ending just before origin of the strongly arcuated or angulated Rs; m-cu near fork of M.

Abdomen, including hypopygium, dark brown. Male hypopygium (Plate 3, fig. 39) with three dististyles, the outer, *od*, a simple glabrous rod; second style clavate, its outer surface densely set with recurved black spines; inner style, *id*, fleshy, with long setæ, including a group of three very powerful setæ on basal half of style. Phallosome without blackened hooks or spines.

Habitat.—New Guinea.

Holotype, male, Simbang, Huon Gulf, July, 1898 (*Biró*).

I take great pleasure in dedicating this fly to the memory of Dr. Koloman Kertész, former custodian of Diptera in the Hungarian National Museum, to whom I express my great personal indebtedness over a period of many years. By Edwards's key to the Oriental species of *Lipophleps*, the present species runs to *Gonomyia* (*Lipophleps*) *diffusa* (de Meijere), a very different species. As usual in this group of Tipulidæ, the structure of the male hypopygium furnishes the most important specific characters. The specimen had earlier been identified as being *Lipophleps brevivena* Skuse by Riedel (No. 25).

GONOMYIA (LIPOPHLEPS) AQUILA sp. nov. Plate 1, fig. 20; Plate 3, fig. 40.

Mesonotum dark brownish gray, the scutellum broadly margined with yellow; pleura striped longitudinally with yellowish white; femora yellow, with a broad black subterminal ring; wings whitish subhyaline and pale brown, the arcular and stigmal areas darker brown; abdominal segments dark brown, ringed caudally with yellow; male hypopygium with the outer dististyle blackened, forked at base into two arms, the outer one longer, glabrous, the inner arm terminating in an acute spine, the dilated apical portion with abundant setæ; phallosome depressed, each outer lateral angle produced into a blackened conical horn.

Male.—Length, about 3 millimeters; wing, 3.5.

Rostrum and palpi black. Antennæ with scape and pedicel dark beneath, yellow above; flagellum brownish black. Head yellow, the center of vertex with a dark area.

Pronotum and pretergites yellow. Mesonotal præscutum and scutum dark brownish gray, the latter with a small point on caudal-lateral portion; scutellum dark basally, broadly margined behind with yellow; mediotergite dark behind, variegated with

yellow on cephalic-lateral angles, the coloration forming a more or less complete crossband at near midlength of the sclerite. Pleura dark, with a ventral longitudinal yellowish white stripe extending from the fore coxæ to base of abdomen. Halteres yellow, the bases of knobs darkened. Legs with fore coxæ whitened, remaining coxæ yellowish testaceous; trochanters yellow; femora yellow, with a broad black subterminal ring that is about two or three times as wide as the pale apex; tibiæ and tarsi obscure yellow, the outer tarsal segments darkened; in cases, the femora are more brownish yellow, the black ring preceded and followed by clearer yellow. Wings (Plate 1, fig. 20) relatively broad, the disk variegated with whitish subhyaline and pale brown; darker brown areas at arculus and stigma; the pale ground areas are arranged as more or less complete crossbands before the cord and at about one-third the length of the wings, in median field and as conspicuous pale areas before and beyond the stigma; veins pale, darker in the clouded areas. Venation: Sc short, Sc_1 ending a short distance before origin of Rs; m-cu close to fork of M.

Abdomen dark brown, the segments narrowly but conspicuously ringed caudally with yellow, most distinct on tergites; hypopygium reddish. Male hypopygium (Plate 3, fig. 40) with the outer dististyle, *od*, profoundly bifid, blackened, the outer arm slender, sinuous, glabrous; inner arm shorter, the outer half a little dilated, terminating in a long straight black spine, the dilated portion with numerous, long, pale, appressed setæ. Inner dististyle pale, terminating in the usual two fasciculate setæ, the apex and cephalic margin of style with long normal setæ. Phallosome, *p*, with each outer lateral angle terminating in a stout, curved, blackened horn.

Habitat.—China. (Szechwan).

Holotype, male, Mount Omei, altitude 4,200 feet, July 2, 1932 (*Franck*). Paratopotypes, 2 males, altitude 4,800 feet, July 4, 1932 (*Franck*).

The nearest ally of the present fly is *Gonomyia* (*Lipophleps*) *angulifera* Alexander, likewise from Mount Omei, where it occurs at higher altitudes on the mountain. The details of the male hypopygia of the two flies are quite distinct.

GONOMYIA (LIPOPHLEPS) ANXIA sp. nov. Plate 1, fig. 21; Plate 3, fig. 41.

Belongs to the *skusei* group; pleural stripe broad and conspicuous, whitish; knobs of halteres obscure yellow; legs dark brown; wings with a strong brown tinge; male hypopygium with

the dististyle subterminal in position, fleshy; phallosome terminating in two flattened plates.

Male.—Length, about 3 millimeters; wing, 3.6.

Female.—Length, about 4 to 4.5 millimeters; wing, 4 to 4.3.

Rostrum and palpi brownish black. Antennæ brownish black throughout. Head with front pale; posterior portion of head chiefly gray, the occipital region variegated by yellow.

Pronotum and anterior lateral pretergites light yellow. Mesonotal præscutum and scutal lobes almost uniformly medium brown, the former very sparsely pruinose; median region of scutum and posterior borders of scutal lobes obscure yellow; scutellum chiefly yellow, the median region at base more darkened; mediotergite darkened. Pleura light brown, with a broad and conspicuous whitish longitudinal stripe, extending from the propleura to base of abdomen, involving also much of pteropleurite and pleurotergite. Halteres dusky, the knobs obscure yellow. Legs with the coxæ brownish testaceous, the fore coxæ slightly darker; trochanters obscure yellow; remainder of legs dark brown, only the femoral bases somewhat paler. Wings (Plate 1, fig. 21) with a strong brown tinge, the stigma scarcely evident; veins brown. Venation: Sc_1 ending about opposite one-third the length of the long Rs, Sc_2 at near middistance between tip of Sc_1 and origin of Rs; m-cu shortly before the fork of M.

Abdominal tergites dark brown, paler laterally; sternites paler; hypopygium brownish yellow. Male hypopygium (Plate 3, fig. 41) with the single dististyle, *d*, fleshy, subequal in length and size to the outer lobe of basistyle, tipped with the usual fasciculate seta; a long modified seta on outer face beyond midlength. Phallosome, *p*, complex, in slide mounts constructed about as figured.

Habitat.—Sumatra (West Coast).

Holotype, male, Fort de Kock, altitude 920 meters, 1926 (*Jacobson*). Allotopotype, female. Paratopotypes, 2 females.

This is the first member of the *skusei* group of the subgenus to be described from the Dutch East Indian islands. It is most nearly allied to a group of three Philippine species, *acanthophallus* Alexander and *macilenta* Alexander, of Mindanao, and *longiradialis* Alexander, of Luzon. All four species agree in having a single fleshy dististyle to the male hypopygium, this with a single specially modified seta on outer margin before apex. These species differ among themselves chiefly in the construction of the phallosome. The other species of the group from eastern

Asia, *sagittifera* Alexander, of Mindanao, and *sauteri* Alexander, of Formosa and western China, are very distinct in the structure of the dististyles of the hypopygium.

GONOMYIA (GONOMYIA) LATILOBATA sp. nov. Plate 1, fig. 22; Plate 3, fig. 42.

Mesonotum and scutal lobes brown, scutellum broadly yellow behind; pleura extensively yellow, the ventral sternopleurite and anepisternum darkened; wings yellowish brown, the diffuse stigma slightly darker; Sc relatively long, Sc_1 extending to about opposite one-fourth the length of Rs; male hypopygium with the dististyle bearing a large flattened dark lobe on outer margin; phallosome with two slender black spines.

Male.—Length, about 3.8 to 4.2 millimeters; wing, 4.5 to 5.

Rostrum and palpi dark brown. Antennæ brownish black throughout; flagellar segments oval. Head above chiefly dark brown.

Pronotum and anterior lateral pretergites light yellow. Mesonotal præscutum and scutal lobes brown, the humeral and lateral portions of the former broadly yellow; pseudosutural foveæ elongate, reddish brown; median region of scutum obscure yellow; scutellum darkened basally, the apical border broadly yellow; mediotergite darkened, the cephalic lateral portions yellow. Pleura extensively yellow, the ventral sternopleurite and ventral anepisternum darkened. Halteres pale, the knobs dusky. Legs with the coxæ darkened; trochanters obscure yellow; remainder of legs brown. Wings (Plate 1, fig. 22) with a yellowish brown tinge, the diffuse stigma slightly darker; veins pale brown. Costal fringe relatively long and conspicuous. Venation: Sc relatively long, Sc_1 extending to opposite or just beyond one-fourth the length of Rs, Sc_2 faint, not far from its tip; R_3 oblique, relatively long; m-cu at fork of M.

Abdominal tergites brown, the sternites more obscure yellow; hypopygium more yellowish. Male hypopygium (Plate 3, fig. 42) with outer lobe of basistyle, *b*, slender, pale. Dististyle, *d*, with a conspicuous flattened dusky lobe on basal half of outer margin, this provided with a single conspicuous seta near base; apical lobe of style with outer margin slightly darkened, the apex with two fasciculate and other normal setæ. Phallosome, *p*, consisting of a compressed pale ædeagus and two subtending, slightly unequal apophyses, both slender, needlelike, blackened.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 3,500 feet, August 17, 1931 (*Franck*). Paratopotypes, 2 males.

Allied to *Gonomyia* (*Gonomyia*) *omeiensis* Alexander, likewise from Mount Omei, differing especially in the details of venation, as the longer Sc and more oblique R_3, and in the structure of the male hypopygium, especially of the dististyle and phallosome.

RHABDOMASTIX MINICOLA sp. nov. Plate 1, fig. 23.

General coloration light gray, the præscutum with indications of slightly darker stripes; antennæ dark brown; halteres pale yellow, the knobs almost white; femora brownish yellow, the tips narrowly infuscated; tibiæ and tarsi brown; wings grayish, the stigma slightly darker; no macrotrichia on veins beyond cord, excepting outer end of R_1 and R_{1+2}; vein R_3 suberect; cell 1st M_2 elongate, with m-cu before midlength; m longer than basal section of M_3.

Female.—Length, about 4.5 millimeters; wing, 4.5.

Rostrum gray; palpi dark brown. Antennæ dark brown throughout, relatively short; flagellar segments oval, with verticils that exceed the segments; terminal segments apparently broken; in the unique type it appears that the basal segment of the flagellum is a fused unit of more than a single segment. Head gray.

Mesonotum almost uniformly light gray, the præscutum with indications of slightly darker stripes; pseudosutural foveæ black. Pleura and sternum gray. Halteres pale yellow, the knobs almost white. Legs with the coxæ gray; trochanters obscure yellow; femora brownish yellow, the tips narrowly infuscated; tibiæ and tarsi brown. Wings (Plate 1, fig. 23) grayish, the prearcular and costal regions pale yellow; stigma pale brown, only a little darker than the ground; veins brown. No macrotrichia on Rs or its anterior branch; M and its branches without trichia; a sparse series along outer section of vein R_5. Venation: Sc_1 ends just beyond midlength of Rs, Sc_2 not evident; R_3 suberect, about equal to the distance along costa between R_{1+2} and R_3; R_4 and R_{2+3+4} subequal; m-cu short, before midlength of cell 1st M_2; m about twice as long as the basal section of M_3.

Abdomen dark brown. Ovipositor with the long cerci horn color.

Habitat.—China (Szechwan).

Holotype, female, Chekiang, on boat on Min River, May 3, 1933 (*Franck*).

Rhabdomastix minicola is very different from *Rhabdomastix* (*Palæogonomyia*) *omeina* Alexander (Mount Omei, Szechwan), differing especially in the venation and coloration of the legs. Because of the sex of the unique type of the present fly, I am unable to place it definitely as to subgenus, but believe it will be found to belong to *Sacandaga* Alexander, with the antennæ short in both sexes.

ERIOPTERA (ERIOPTERA) HAPLOSTYLA sp. nov. Plate 1, fig. 24; Plate 3, fig. 43.

Male.—Length, about 4.5 millimeters; wing, 5.

Very similar in general appearance to *Erioptera* (*Erioptera*) *luteicornis* Alexander, likewise from the mountains of western China, differing in the details of structure of the male hypopygium.

General coloration pale yellow; mesonotal præscutum light reddish brown, somewhat darker medially. Basal four or five antennal segments yellow, the remainder passing into brown. Knobs of halteres blackened. Legs yellow, the tips of femora scarcely darkened. Wings (Plate 1, fig. 24) very pale yellowish white; veins pale yellow; macrotrichia light brown. Venation: m-cu long and gently sinuous; vein 2d A strongly sinuous, cell 1st A at midlength nearly three times as wide as at the narrowest point just before outer end. Abdomen dark brown; hypopygium brownish yellow. Male hypopygium (Plate 3, fig. 43) with the outer dististyle, *od*, simple, darkened, quite glabrous, its outer third narrowed. Inner dististyle, *id*, a shorter sinuous rod, the obtuse dusky apex with a number of setigerous punctures; on outer margin just before midlength with a small pale finger-like lobe that is tipped with a single small pale spine. Gonapophyses, *g*, appearing as nearly straight to gently curved darkened rods, the tips cultriform; each inner apophysis bearing at tip a small darkened peglike spine.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 7,000 feet, July 17, 1931 (*Franck*).

MOLOPHILUS TETRAGONUS sp. nov. Plate 3, fig. 44.

Belongs to the *gracilis* group and subgroup; general coloration of mesonotum light reddish yellow; antennæ (male) short; legs obscure yellow, wings light yellow; male hypopygium with two small spinous lobes at apex of each basistyle; outer dististyle with a dense brush of spinous setæ on outer half; inner

dististyle slightly dilated at apex, further produced laterad into a small apical point.

Male.—Length, about 3 millimeters; wing, 4.

Rostrum pale brown; palpi brownish black. Antennæ (male) short; basal segments pale, the outer segments a little darker. Head discolored in type, chiefly dark.

Thoracic dorsum almost uniformly light reddish yellow, the humeral region of præscutum clearer yellow; mediotergite somewhat darker. Pleura with dorsal sclerites reddish brown, the ventral sclerites more yellow. Halteres pale, the knobs broken. Legs with the coxæ and trochanters light yellow; remainder of legs slightly more obscured yellow, the terminal tarsal segments darker. Wings light yellow, veins somewhat darker; macrotrichia dark brown. Venation: R_2 lying almost in transverse alignment with the basal section of R_5; petiole of cell M_3 about twice m-cu; vein 2d A ending just before level of caudal end of m-cu.

Abdominal tergites dark brown, the sternites somewhat more brightened; hypopygium light yellow. Male hypopygium (Plate 3, fig. 44) with the dorsal lobe of basistyle, *db*, setiferous on basal two-thirds, thence suddenly narrowed into a very slender acute spine that is darkened only on outer third; ventral lobe of basistyle a similar spine of almost the same length but a little stouter, glabrous to base. Two dististyles, the outer, *od*, a long, yellow, ribbonlike structure, the distal half blackened, narrowed to an acute point at apex, the blackened portion on inner or lower face densely provided with long spinous setæ that are arranged in at least two ranks. Inner style, *id*, nearly as long, yellow, the apex slightly dilated into a darkened head that is further produced laterad into an apiculate point; capitate portion of style with a series of ten to twelve microscopic punctures along outer margin before the point.

Habitat.—China (Szechwan).

Holotype, male, Mount Omei, altitude 4,200 feet, June 29, 1932 (*Franck*).

Molophilus tetragonus is quite distinct from the other Palæarctic species of the genus in the structure of the male hypopygium. The dense brush of setæ on the outer dististyle is somewhat suggestive of the condition in *M. triacanthus* Alexander (Japan), but all other characters are quite distinct.

ILLUSTRATIONS

[Legend: *a*, aedeagus; *b*, basistyle; *d*, dististyle; *db*, dorsal lobe of basistyle; *g*, gonapophysis; *i*, interbase; *id*, inner dististyle; *mb*, mesal lobe of basistyle; *od*, outer dististyle; *p*, phallosome; *s*, sternite; *t*, tergite; *vd*, ventral dististyle.]

Plate 1

Fig. 1. *Tipula* (*Vestiplex*) *deserrata* sp. nov.; venation.
2. *Tipula* (*Vestiplex*) *kwanhsienana* sp. nov.; venation.
3. *Tipula* (*Acutipula*) *dicladura* sp. nov.; venation.
4. *Tipula bipendula* sp. nov.; venation.
5. *Limonia* (*Libnotes*) *diphragma* sp. nov.; venation.
6. *Limonia* (*Libnotes*) *chrysophæa* sp. nov.; venation.
7. *Limonia* (*Libnotes*) *nigerrima* sp. nov.; venation.
8. *Limonia* (*Limonia*) *coxitalis* sp. nov.; venation.
9. *Limonia* (*Limonia*) *quantilla* sp. nov.; venation.
10. *Limonia* (*Dicranomyia*) *rectidens* sp. nov.; venation.
11. *Limonia* (*Rhipidia*) *formosana expansimacula* subsp. nov.; venation.
12. *Helius* (*Rhampholimnobia*) *papuanus* sp. nov.; venation.
13. *Orimarga* (*Orimarga*) *latissima* sp. nov.; venation.
14. *Orimarga* (*Orimarga*) *basilobata* sp. nov.; venation.
15. *Orimarga* (*Orimarga*) *risbeci* sp. nov.; venation.
16. *Hexatoma* (*Eriocera*) *minensis* sp. nov.; venation.
17. *Hexatoma* (*Eriocera*) *diploneura* sp. nov.; venation.
18. *Gynoplistia* (*Gynoplistia*) *novem-pectinata* sp. nov.; venation.
19. *Gonomyia* (*Lipophleps*) *kertésziana* sp. nov.; venation.
20. *Gonomyia* (*Lipophleps*) *aquila* sp. nov.; venation.
21. *Gonomyia* (*Lipophleps*) *anxia* sp. nov.; venation.
22. *Gonomyia* (*Gonomyia*) *latilobata* sp. nov.; venation.
23. *Rhabdomastix minicola* sp. nov.; venation.
24. *Erioptera* (*Erioptera*) *haplostyla* sp. nov.; venation.

Plate 2

Fig. 25. *Tipula* (*Vestiplex*) *deserrata* sp. nov.; male hypopygium, details.
26. *Tipula* (*Vestiplex*) *kwanhsienana* sp. nov.; male hypopygium, details.
27. *Tipula* (*Acutipula*) *dicladura* sp. nov.; male hypopygium, details.
28. *Tipula* (*Acutipula*) *platycantha* sp. nov.; male hypopygium, details.
29. *Tipula bipendula* sp. nov.; male hypopygium, lateral aspect.
30. *Tipula bipendula* sp. nov.; male hypopygium, dististyle.
31. *Tipula bipendula* sp. nov.; male hypopygium, details.
32. *Limonia* (*Limonia*) *coxitalis* sp. nov.; male hypopygium.
33. *Limonia* (*Limonia*) *quantilla* sp. nov.; male hypopygium.

PLATE 3

FIG. 34. *Limonia* (*Dicranomyia*) *rectidens* sp. nov.; male hypopygium.
35. *Helius* (*Rhampholimnobia*) *papuanus* sp. nov.; male hypopygium.
36. *Orimarga* (*Orimarga*) *latissima* sp. nov.; male hypopygium.
37. *Orimarga* (*Orimarga*) *basilobata* sp. nov.; male hypopygium.
38. *Gynoplistia* (*Gynoplistia*) *novem-pectinata* sp. nov.; male hypopygium.
39. *Gonomyia* (*Lipophleps*) *kertészíana* sp. nov.; male hypopygium.
40. *Gonomyia* (*Lipophleps*) *aquila* sp. nov.; male hypopygium.
41. *Gonomyia* (*Lipophleps*) *anxia* sp. nov.; male hypopygium.
42. *Gonomyia* (*Gonomyia*) *latilobata* sp. nov.; male hypopygium.
43. *Erioptera* (*Erioptera*) *haplostyla* sp. nov.; male hypopygium.
44. *Molophilus tetragonus* sp. nov.; male hypopygium.

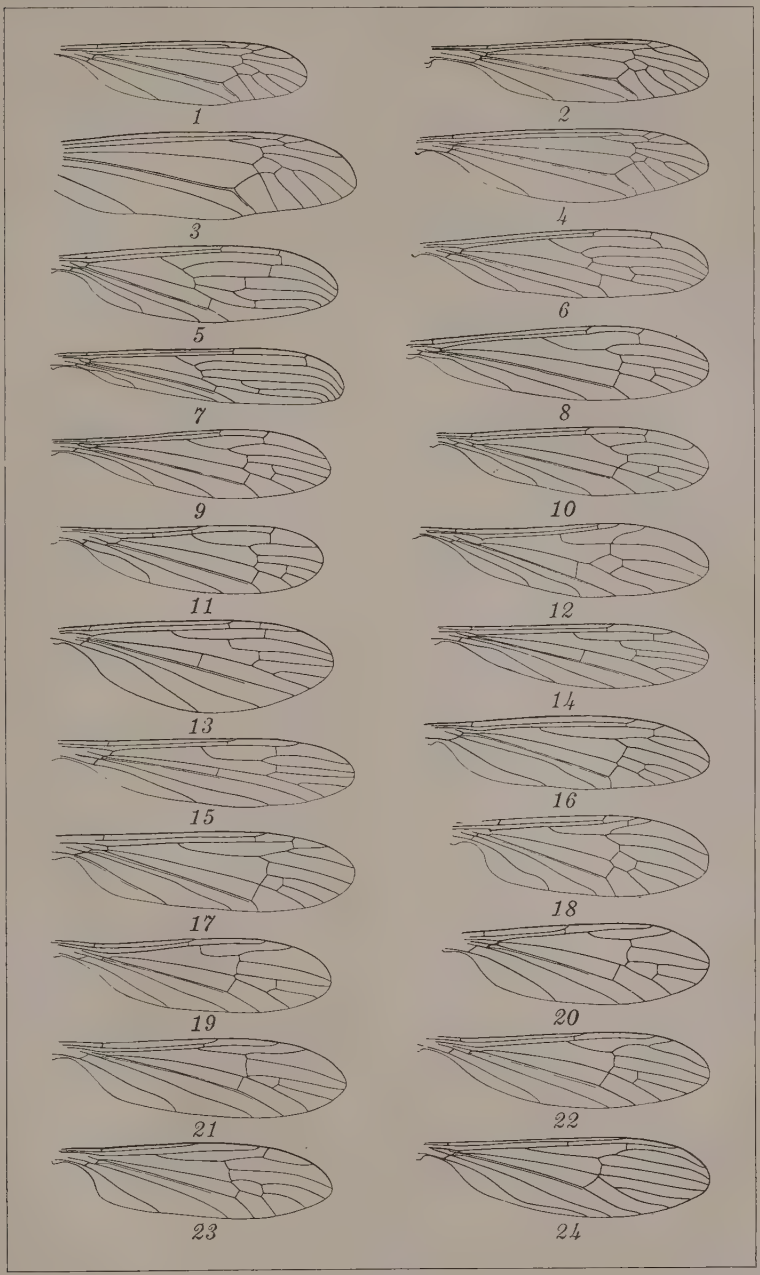

PLATE 1.

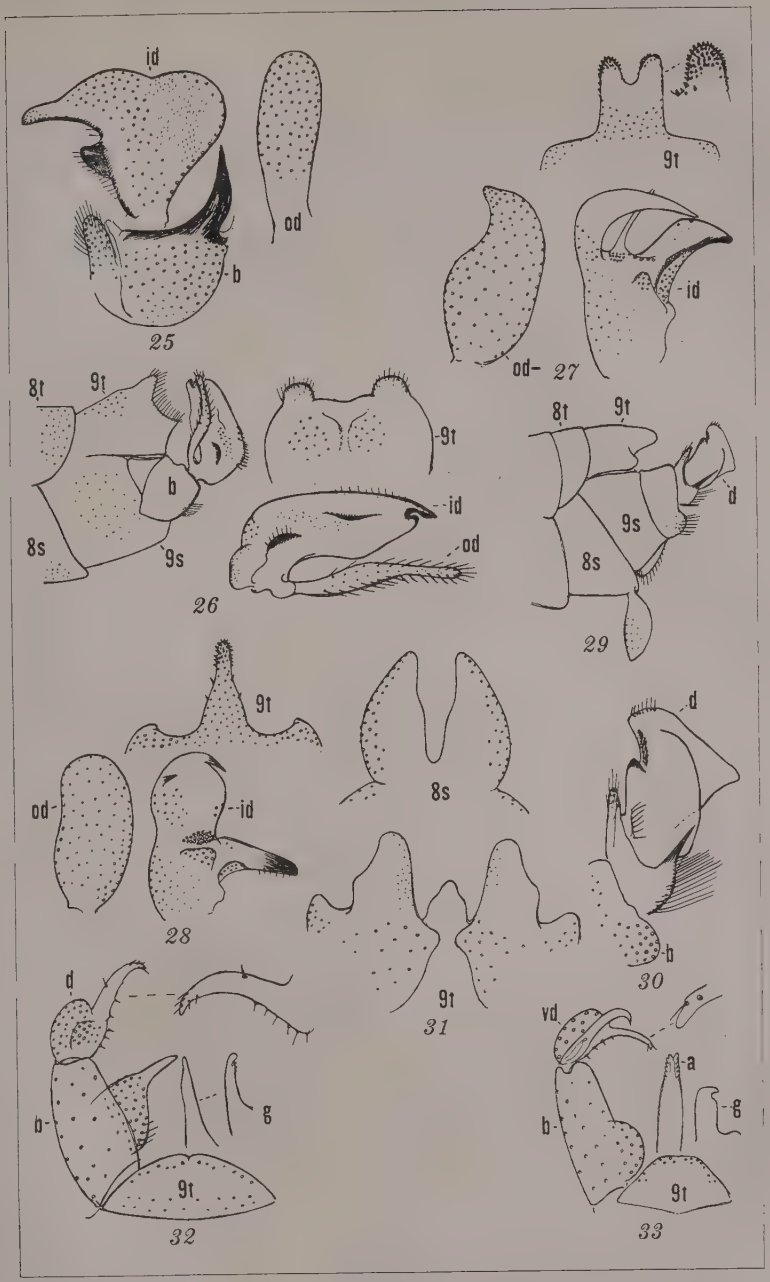
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PLATE 2.

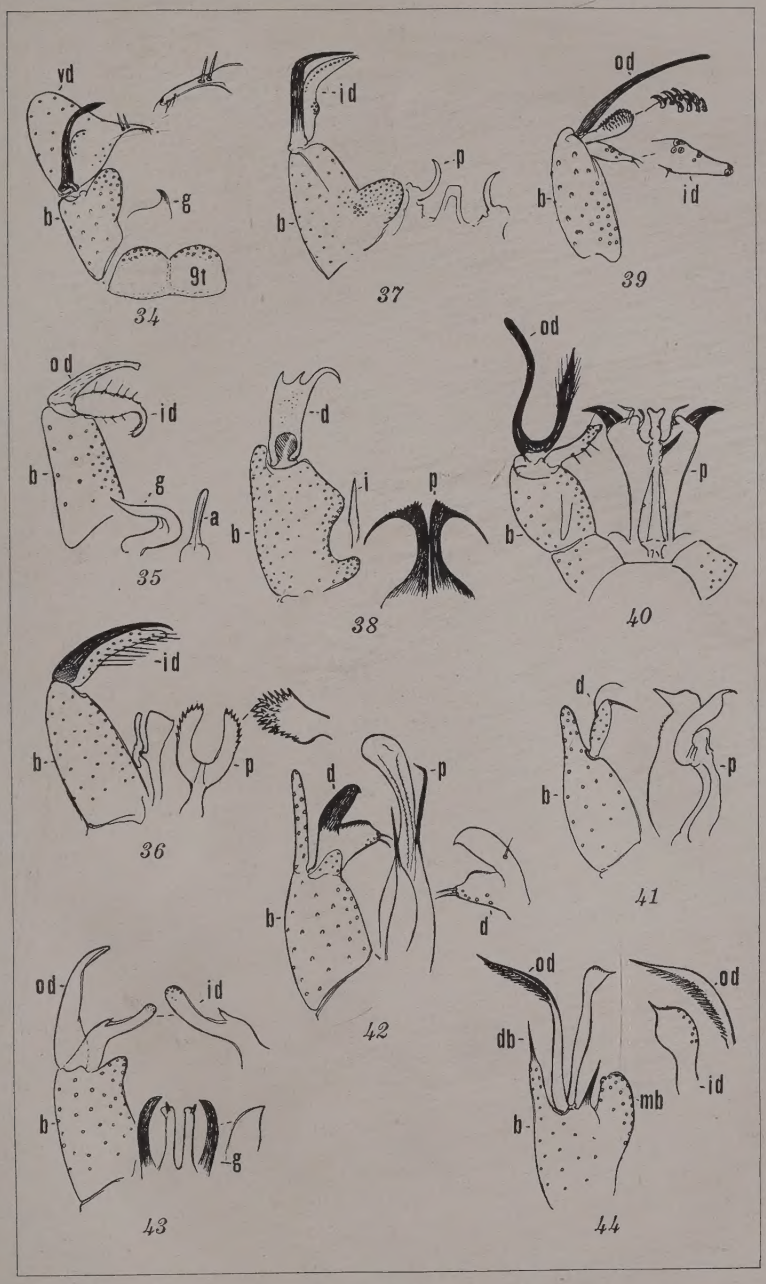
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PLATE 3.